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THE ANTI-SIPHON TRAP DEFENDED.

In their zeal to bring about improved conditions, municipalities sometimes go too far and enact regulations which are unwise and retrogressive. The city of San Francisco has just done this. That city has won the world's admiration for its wonderful rebuilding, but it will have to submit to the severe criticism of advanced sanitarians for the action taken by its Department of Public Health, which, on Dec. 13, 1909, passed the following resolution:

> "Be it resolved, that the Department of Public Health of the City and County of San Francisco is absolutely opposed to any form of anti-siphon trap or the adoption of any plan of plumbing that would in any way have a tendency to interfere with the proper venting of plumbing fixtures."

* * *

Every sanitary engineer who is abreast of the latest knowledge of plumbing will deeply regret this action. With unthinking people the fact that an enterprising city like San Francisco has gone on record as opposing the use of anti-siphon traps, will have an influence. It will cause a certain number of health departments to follow blindly in the same direction, not knowing that such action is considered absolutely wrong by most authorities.

* * *

A brief analysis of the subject will show why the San Francisco Department of Health is wrong.

The resolution it has adopted reads as though the department regarded fixture-trap venting as a desirable end in itself, instead of being what it really is, an expensive means to attain an end.

As years go by and scientific investigation is made to determine its real character, the fear of sewer and drain air as a cause of disease has become greatly modified. From being considered a potent cause of disease, modern science now establishes the fact that the air of house drains and sewers contains many times less bacteria than the air of the open street. The report of the sanitary committee of the National Association of Master Plumbers (1909) fully bears out this statement. This valuable report closes with these words:

"I believe, however, that my results, in the light of all previous evidence, warrant the conclusion that the chance of direct bacterial infection through the air of drains and sewers is so slight as to be practically negligible." (Page 85.)

* * *

The first logical premise is, then, that air in house drains and sewers, lacking in danger as a carrier of disease, is merely a bad smell which esthetic reasons demand shall be kept from inhabited rooms. This may be accomplished in two ways, the first of which is the absurdly complicated and expensive back-venting system, to prevent trap siphonage, which as practised now is the result of years of groundless fear of breathing sewer gas. The second is the intervention of the anti-siphon trap which accomplishes the same object as the first named, at a small portion of the cost. Referring to the system of back-venting it is shown in the same report quoted above (page 32) "that a very large percentage of the trap-venting as now practised is not needed.

* * *

If the only object of interposing traps in waste pipes is to prevent the entrance of a bad smell, then it must follow as a logical conclusion, that the only object of a back-venting system, preventing the traps from losing

their seals, is to insure the exclusion of the bad odor. It must then follow, as a second logical deduction, that if anti-siphon traps do not lose their seals in actual practice, and successfully accomplish the exclusion of house-drain air from inhabited rooms, that they perform all the service expected from complicated back-venting systems, at a much less cost, and therefore their use should be permitted; yes, even encouraged.

* * *

Now, do anti-siphon traps actually prevent the loss of water-seals in ordinary plumbing practice? To answer this question let me quote from J. J. Cosgrove's "Principles and Practice of Plumbing" (1906, pp. 252-253) where, in describing the tests of non-siphoning traps made in 1903 by the Board of Health of Trenton, N. J., in 1903, he writes: "The tests to which these traps were subjected were unusually severe and cannot be taken as representative of the siphonic action they would be required to withstand in a well-designed drainage system. So severe was the siphonic action during the test that when a sheet of common note-paper was placed over the elbow of the branch to which the traps were to be connected, and the water turned on, a round disc was cut out of the paper as cleanly as though done with a knife. It is a well-understood principle of engineering practice that a suitable factor of safety should be provided in all structural materials and apparatus. This factor of safety seldom exceeds five times the strain to which the apparatus will be subjected. In the case of the trap tests conducted by the Trenton Board of Health, however, the siphonic action must have been at least 20 times as severe as the conditions that obtain in a well-designed drainage system." Mr. Cosgrove concludes: "Any of the traps that withstood the Trenton test would be perfectly safe for any plumbing installation."

* * *

Mr. Cosgrove shows, I think, the Department of Health of San Francisco to be wrong in forbidding the use of anti-siphon traps and in requiring, under all conditions, the back-venting of fixture traps; but, in order to show that, in most cases at least, the use of anti-siphon traps is as desirable as the installation of back-venting, I quote from "Sanitary Engineering of Buildings," by William Paul Gerhard, C. E. (1899: pages 408-409), in which he summarizes the objections to back-venting:

(1) "The venting of traps leads to a greater and sometimes dangerous complication of the work.

(2) "It involves a useless outlay of money.

(3 "It increases, and often doubles, the number of pipe-joints in a building, it duplicates the pipe system and therefore increases the danger of leakage at the joints.

(4) "Trap vents attached to the horns of porcelain fixtures, such as water-closets, often lead, in case of the settlement of the building, or through expansion, to the breakage of these horns, thus opening up a dangerous inlet for sewer air, the crack often remaining unnoticed for years.

(5) "The mouth of the vent pipe at the point where it attaches to the crown of the trap, is liable to clog up with congealed greasy deposits, rendering the vent-pipe useless without this fact becoming apparent to the occupant of the house.

(6) "The upper end of the back air-pipe, where it extends separately to the roof, is liable, unless enlarged to at least four inches in diameter, to be closed up with snow or hoar-frost in winter time.

(7) "Owing to the increased air-current passing over over the water-seal of the trap, and induced by the vent-pipe, the destruction of the water-seal by evaporation is much more rapid.

(8) "The trap-venting system affords increased opportunities for bye-passes in the case of careless or ignorant workmen. In my examinations of the plumbing of houses I have discovered bye-passes even where such work was done under Board of Health inspection.

(9) "In the case of long vent-pipes, particularly where there are several sharp bends in the pipe, the friction of the air passing through the pipe is sometimes increased to such an extent that the vent-pipe fails to protect the trap from siphonage."

That Mr. Gerhard's views have not changed in relation to back-venting during the ten years which have passed since he wrote the foregoing, is shown by the following, quoted from his last work, "Water Supply, Sewerage and Plumbing of Modern City Buildings" (1909; page 184): "I have for many years contended, and a long experience has only confirmed my views, that where plumbing fixtures are located within a short distance of a well-ventilated soil or waste line, the special back-air pipes can with safety be dispensed with, provided non-siphoning traps are used under basins, bath-tubs and sinks, and provided types of water-closets are used which have a deep water-seal."

* * *

With this last authority the case against the San Francisco Department of Health is completed. In closing I wish to add that simplification of plumbing must come. If it comes with the assistance of the plumbing fraternity, so much the better; but come it must.

JNO. K. ALLEN.

TO JOIN AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

The Membership Committee of the American Society of Heating and Ventilating Engineers has issued a membership ballot containing the following lists of applicants for membership in the society with the statement that their qualifications have been duly considered with the result that the committee hold them professionally qualified for membership as follows:

Members.

Samuel A. Anderson, 412 Fourth St., San Francisco.

S. Morgan Bushnell, 135 Adams St., Chicago.

Frank T. Chapman, Engineers' Club, New York City.

Arthur E. Duram, 1108 American Trust Bldg., Chicago.

Elliott Lee Ellingwood, 1005 Union Trust Bldg., Los Angeles, Cal.

M. L. Foote, Columbus, O.

A. Edson Hall, State Capitol, Albany, N. Y.

Ralph B. Hayward, 123 E. Kinzie St., Chicago.

Edmund J. Hurley, 550 West 23rd St., New York City.

Charles D. Kirk, 788 Beverly St., Winnipeg, Man.

Wm. F. McDonald, 1810 Ford Bldg., Detroit.

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A. E. Werkhoff, Lafayette, Ind.

Edward L. Wilson, 1201 Q St., N. W., Washington, D. C.

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Charles Morrison, 35 Laurel St., Melrose, Mass.

Wm. A. Youngquist, 1200 Michigan Ave., Chicago.

Junior Members.

Laurance C. Jost, 4935 Rubicam Ave., Philadelphia.

Murray J. Marvin, Tuskegee Institute, Ala.

Heat: Its Use and Distribution*

Since the subject presented tonight has been of absorbing interest to physicists for many years, I approach it, and desire to present it to you, from the standpoint of a student and not an instructor. Many volumes have been written on what must here be briefly sketched, and the endeavor will be to transform our appreciation of heat phenomena into an active instead of passive acceptance.

To the average layman the problems connected with our use of heat appear detached and isolated. He fails to grasp the correlation of the various manifestations of heat phenomena. Ordinarily the word "heat" is used to denote an appreciable rise in temperature above that which our bodily senses label as normal; but the word has a much broader meaning, and the farther the investigation proceeds the more we find that forces set in motion by heat transference are integral with life itself.

The philosophy of heat is the study of its transference from one body to another, and without transference heat is useless as a work agent. All mechanical effort of whatever nature can be expressed in its equivalent heat value, and vice versa. Therefore, in considering heat phenomena, we must study its manifestations if we desire to arrive at a true appreciation of its relation to our present civilization. In dealing with the various forms of heat and its transference, no attempt will be made to more than outline their general relationship to each other and to the source of all heat.

Heat is transmitted by radiation, conduction and convection. Radiant heat is transmitted by the ether which permeates all matter and stellar space. Heat by conduction is transmitted by molecular activity along the same substance or from substance to substance in contact. The transference or shifting of heat by convection is only possible in liquids or gases where masses of heated material are shifted bodily into contact with other masses, the final heat transference taking place by radiation or conduction.

The earth receives heat from many sources, but its chief supply comes in the form of radiant heat from the sun. The active principle which makes the sun the supplier of heat for our planetary system is purely a matter of conjecture, but the most recent discoveries in atomic activity would seem to point to the transformation of the sub-atomic kinetic energy into heat as the maintainer of the sun's heat. That radiant heat is purely a force carried by the ether, and not an atomic or molecular transmission, is evidenced by the extreme cold on high mountains. The heating of the atmosphere and earth is accomplished by the force in the impinging ether waves being transformed into molecular activity which becomes sensible as heat. The ether may therefore be considered as an elastic medium through which the molecular activity of the sun is conveyed to the earth, the intervening space being in a state of absolute cold. By means of the hydrogen thermometer the absolute zero, or state of matter or gas where all heat is absent, has geen determined as 273 degrees cent. (below freezing point). At this temperature all molecular motion of matter ceases, and it is presumed that this is the temperature existing in stellar space.

*Read before the Association of Engineering Societies, May 10, 1909, by Lyman C. Reed, Member Louisiana Engineering Society and reproduced by courtesy of the Journal of that Association.

The atmosphere which envelops the earth furnishes a medium that enables us to exist, and its temperature varies in different zones and seasons, this condition being brought about by the changing relations in position of the earth and sun. Minor local disturbances are set up by air and ocean currents caused by varying heat conditions, but the atmosphere as a whole acts as an equalizing agent, and all objects enveloped therein tend to become of the same temperature. A piece of ice placed in a bowl and exposed to the air becomes of the same temperature in time, as likewise does the red hot iron removed from the fire. The ice can only remain ice when the air is warmer than it is by an expenditure of energy, and the iron can remain hot by the same means. The surrounding air is temporarily cooled by the melting ice and likewise heated by the iron, but the cooling and heating are equalized and blended until the melted ice, iron and air reach the same temperature. The quickness of this blending is dependent upon the value of the heat insulation separating the objects. Where the objects differ greatly in heat potential the instant blending of their heat values results in many cases in violent disturbances similar to the disturbance caused by the short circuit of electric currents of high potential. It is much more difficult to insulate for heat than for electricity as nearly all solids and liquids are fairly good conductors of heat, while many substances are practically perfect insulators for electricity.

If a pound of iron at 400 deg. F. be immersed in a pound of water at 100 deg. F. the resulting temperature of the water and iron will be about 124 deg., neglecting the loss from radiation. This resultant temperature will be rapidly reduced to that of the surrounding atmosphere. Now if the pound of iron instead be placed on a table a foot away from the vessel containing the pound of water the iron and water will be reduced to atmospheric temperature without the iron having appreciably raised the temperature of the water.

From the above is deduced the law that bodies of differing heat potentials are equalized in temperature along the lines of least resistance.

The mere fact that the earth and atmosphere are such large quantities in comparison with other objects makes their temperature the controlling factor in all heat equalization.

As heat is recognized as molecular vibration, it is apparent that all objects in a state of heat equilibrium vibrate in synchronism, and when this vibration is accelerated or diminished by a change of state or condition the temperature is said to increase or decrease as the case may be. A change in temperature can be produced by the direct application of heat or by various other equivalent means, but in order to keep the object from synchronizing with its environment the application must be maintained. The work thus performed or energy equivalent may be expressed in concrete form and has been defined as the mechanical equivalent of heat. The amount of work represented by raising the temperature of one pound of water from 60 to 61 deg. F. is equivalent to the force necessary to lift 778 lbs. through 1 ft. It is evident, therefore, that the momentary energy equivalent to any object raised above or depressed below the temperature of its environment is expressed as 778 ft. lbs. multiplied by the number of B. t. u. contained in the object.

This energy may not be in shape to use commercially, and frequently merely represents the transference of heat from one body to another. All heat values are in a constant state of mutation, and it is fair to assume that the heat received by the earth from the sun during one complete orbit just balance that which the earth radiates during the same period, otherwise we should either roast or freeze in a short time. Thus all matter, including the earth and atmosphere, when raised above the temperature of its surroundings, tends to return to the absolute zero but is arrested in its progress by encountering a temperature maintained by the sun's influence.

The quantity of heat in any earthly object is so infinitesimal in comparison with the sea of heat in which it is immersed that it is only a question of time until a like temperature is reached. In the same manner any matter which has been carried below the temperature of its environment either by artificial or natural means cannot descend lower without the expenditure of energy, but is restored to the temperature of its surroundings by transference of heat to it from surrounding bodies.

A simple explanation of these phenomena of heat transference is furnished by the theory that all matter radiates heat, the object of low-heat-potential having its molecular vibration accelerated by the surrounding objects of higher heat-potential, the whole earth being kept in a state of heat activity by the ether waves received from the sun. It is worthy of notice that all heat transference takes place from the warmer to the colder body.

Does not the question here arise whether the mean temperature of the earth is a rough measure of the power of the ether waves impinging thereon? The fact that any substance exposed to the hottest rays of the sun does not rise above 200 deg. F. shows that the sun's rays unaided cannot excite a greater molecular activity than that of which this temperature is the index. Greater temperature can be obtained by focusing the rays through a reflector or lens; the momentum of the impinging ether waves is not changed nor their intensity, but they are simply added together.

A simple analogy would be furnished by dropping a flat disk of large diameter and a rod of the same weight from a given height. The impact would be the same, but the penetration of the rod would be far greater than that of the disk.

The difficulty in focusing a quantity of the ether waves to raise a large mass to higher heat-potential has been the stumbling block in our utilization of the sun's rays for power purposes. Another analogy is presented in our large rivers of low head; the quantity is there, but the potential or head renders their use of little value.

Before passing to a consideration of the use of heat, a few of its most salient properties will be noted.

Radiant heat, light and electricity are transmitted by ether waves of different lengths and frequencies traveling at the rate of 186,000 miles per second. Radiant heat waves impinging against a mass are transformed into molecular activity in proportion to the mass's thermal conductivity.

Light waves impinging against a mass are either transmitted, reflected or absorbed, according to the nature of the substance.

When electricity is transmitted over a conductor it travels with the speed of light but sets up in the conductor a molecular activity proportional to its conductivity which manifests itself as heat. Such metals as silver, copper, mercury, iron, etc., exhibit approximately the same thermal and electrical conductivity, showing that the molecular resistance to heat and electrical transference is in the same ratio.

It takes an appreciable time to heat a conductor either by electrical or thermal means, but a conductor of uniform cross-section and given length is equally heated in all parts at the same time by the passage of electric current but very slowly and in diminishing degree from the heated to the colder portion by conductive heat. A molecular mass is, therefore, necessary to conduct electric current of low periodicity such as we use commercially, but offers a screen to radiant heat varying in effectiveness with the nature of the substance. Can we not consider the heat manifested in an electrical conductor as a sort of molecular friction caused by the ether waves in passage, particularly in view of the fact that the heat generated is directly proportional to the cross section of the conductor?

The recent developments in radio-activity and the marvelous heat-giving qualities of radium have changed the theory of atomic activity into one endowing the atoms with active particles called electrons which contain an electric charge. These electrons are about 1-1000 the size of the hydrogen atom and are supposed to revolve in groups forming atoms. The emanations from radium seem to consist of these highly charged electrons, and 1 gm. of radium in disintegrating gives out as much heat as the combustion of a ton of coal.

Heat in the abstract is, therefore, possibly more activity of the electrons than molecules themselves, and the intensity of this activity defines the amount of heat. A blow, a radiant heat wave, a convection current of heated air and the thing we call substance responds at once to the greater activity, in turn passing it along to some other substance, all by means of an elastic medium which permeates all things, yet is unseen, unfelt, untasted,—the ether.

A great similarity exists between the laws of heat and the laws of gravity. Bodies at rest remain at rest unless energy is exerted to move or set them in motion, and the same rule applies to a change in temperature. The energy needed to disturb a body can be expressed in both instances in heat equivalent.

The law of gravity may be expressed in B. t. u. value of the stored potential and kinetic energy imparted to a body in motion. Thus 1 lb. of iron raised 1 ft. from the ground in one minute represents when released a B. t. u. value of .077 units. Bodies at any temperature above absolute zero require the expenditure of energy to keep them stable and this may be imparted by the surrounding objects; their net loss equals the object's net gain. Any change in equilibrium either through the law of gravity or heat transference causes an object to give out a heat or mechanical value.

(To be continued.)

John W. Farrell, plumbing inspector, Salt Lake City, Utah, was presented with a handsome gold watch as a Christmas gift from the master plumbers in that city as a token of their appreciation of his efforts to raise the standard of plumbing work in his city and to make Salt Lake City a model town as far as up-to-date sanitation is concerned.

Richmond, Ky.—The Richmond Motor & Plumbing Company has been awarded the contract for the plumbing and heating in the First National Bank building. The consideration is $2,500.

If you've got a bright idea,
Tell "Domestic Engineer."

Questions and Answers

ANOTHER REFERENCE TO THE PRESSURE HOT-WATER JOB AT MERRILL, WIS.

Editor "Domestic Engineering":—Referring to the sketch of hot-water heating plant installed by L., at Merrill, Wis., will say, certainly it works O. K. Why, I put in just such an affair 20 years ago for C. R. Hicks on E. 9th St., Kansas City, Mo. I will say that he never had a particle of trouble. I am surprised that any one should doubt it. Yours respectfully,

Kansas City, Kan. **A. J. Meyers.**

POINTS ON A HOT-WATER CIRCULATION.

Editor "Domestic Engineering":—I take the greatest of pleasure in reading your questions and answers and would say that in number 272 by W. D., the job will short circuit. To remedy this, connect flow to radiator first and cut out direct cold supply to circulating system, except through boiler and the job will work and give heat according to the amount of heat applied.

Fort Worth, Tex. **C. G.**

POINTS ON HEATING RADIATORS FROM A COIL IN THE CELLAR HEATER.

The answer of Mr. Claggett refers to a question asked by a correspondent who wanted to heat two hot-water radiators from a coil, presumably placed in a hot-air heater, located in the cellar, and was published in issue of Dec. 4, 1909.

E. D.

Editor "Domestic Engineering":—J. W., Unionport, O., asks about setting radiators. I have set many such. My articles published in "Domestic Engineering" some time ago explain how to set them and how not to set them.

Use expansion can above radiators. Let flow-pipe lead to it full size. Tee into the tops of radiators; return from bottoms; a radiator on first floor connected to the return pipe helps wonderfully to make the water flow up the flow-pipe. I have built two or three plants where the water acts foolish and does not know which pipe to ascend. They heat the radiators, but not as well as the plants that are properly constructed. J. W. should use 1½-in. pipe and a Champion water heater. Yours fraternally,

Montevideo, Minn. **Geo. H. Claggett.**

THIS HOT-WATER JOB IS A WIND-JAMMER.—WHO CAN SOLVE IT?

Editor "Domestic Engineering":—I have a hot-water system in my house and desire to know some means by which I can get the air out of the radiators on the second floor. In the after part of the night, when the fire goes down, I can hear the air start from the basement near the heater and by the time it gets to the radiator on the second floor it makes quite a noise. If you can give me the desired information I will be grateful for the same.

Newell, W. Va. **P.**

We would suggest that as the air seems to get into the job when the fire has gone down somewhat, as it would in the "after part of the night" that there must be something wrong with the expansion tank on the job. Either it is too small for the amount of radiation it is supposed to supply, or else it is not connected properly to the job. Not having any sketch of the job we are unable to say more at this time. Perhaps some of our many readers may have had a similar experience, and if so we should be glad to publish it.

CORRECTION TAKEN WITH PLEASURE.

Editor "Domestic Engineering":—Not wishing to criticise our friend Phoenix, as he at heart is certainly doing missionary work for the craft, I would call his attention to the co-efficient of expansion for wrought iron as being 1-150,000 instead of 1-1,500,000, and in working out his problem this would make the expansion of 100 ft. of pipe 1.216 instead of 0.1216. I am calling his attention to this in a cordial spirit. Sincerely yours,

J. Y.

I desire to take off my hat to friend "J. Y." for the exceedingly kind way which he has taken to call to my attention a blunder made by myself in the article on formulas published in the issue of Dec. 4, 1909. Mistakes sometimes occur in the best regulated families and this is one on me. I also appreciate, more than appears in these few lines, his kindly words in regard to the missionary work and assure him that a few words of commendation now and then make the "sleddin'" much easier. Yours,

"Phoenix."

CONVENTION DATES.

January 18, 19 and 20, 1910.—Sixteenth annual meeting of the **American Society of Heating and Ventilating Engineers,** in New York City. The sessions will be held in Engineering Societies building, 29 West 39th street.

January 20, 21 and 22, 1910.—Fifth annual meeting of the **American Society of Inspectors of Plumbing and Sanitary Engineers,** at Trenton, N. J.

January 26 and 27, 1910.—Annual convention of the **Illinois Master Plumbers' Association,** at Springfield, Ill. Headquarters at the Annex of the St. Nicholas Hotel.

March 7 and 8, 1910.—Annual convention of the **Kansas State Association of Master Plumbers,** at Kansas City, Kans. Headquarters at the Grand Hotel.

March 8 and 9, 1910.—Annual convention of **New York State Association of Master Plumbers,** in New York City.

WILLIAM H. NEWELL PASSES AWAY.

William H. Newell, a widely known manufacturer of plumbing specialties, passed away last week at his home in Philadelphia, Pa. after an illness of three weeks. He was a native of Philadelphia and, after serving his apprenticeship with the Cooper, Jones & Cadbury Co., was promoted to be superintendent, a position he held for many years. Failing in health, he went west and engaged in business in Denver. Upon his return to Philadelphia he established the Newell-Booth Co., at Broad and Buttonwood streets, and later the William H. Newell Brass Co. Mr. Newell was a Mason, and this fraternity conducted the services at his burial. He is survived by his wife and three children.

ARE YOU GOING TO CEDAR RAPIDS?

Jan. 18, 19 and 20, 1910.—Annual convention of the Iowa Master Plumbers' Association, at Cedar Rapids, Ia. Headquarters at the Montrose Hotel. The officers of the association are: President, J. F. Garvey, Mason City; vice-president, C. G. Bosch, Burlington; treasurer, J. F. Gearen, Sioux City; secretary, Wm. J. Nesler, Dubuque; organizing secretary, W. A. Bruce, Des Moines.

The Side-Door Route

By Phoenix.

If you have wandered through the woods, or down in the meadows, or over the great western prairies, you have occasionally come upon well-beaten paths leading from somewhere to almost any old where. Naturally, the general run of humanity, if they are traveling and find a well-beaten path favoring their direction, will take to the path almost instinctively.

It is easier walking, the road is already marked out, and besides some one has previously been over that route.

Did you ever watch a drove of cattle passing along the highway? The bunch hangs pretty well together. Pretty soon one breaks loose and strikes out according to its own notion, along some other direction than the regular trail. Notice this particular animal, and you will generally find that in many points it is better looking and stronger, or more obstinate, than the majority of the herd.

This plumbing craft is peculiar! Many a plumber follows forever the beaten path and never accumulates strength nor character enough to loose himself among the wilds of independence.

There is a practice in our craft known as "floating," whereby a man may be in Chicago today and perhaps two or three days later may show up in Omaha, and never pay a cent of car fare.

Now "floating" does not pay. It is a long, rough, cold ride and generally on half rations. The floater is out of a job and is tramping around the country trying to find one. Going at it in a hit-or-miss fashion with the same want of foresight that he exhibits along many other lines which I have mentioned previously.

Some "home guard" will say right here, "a good man is never out of a job." This is a mistake.

My observations and experiences, extending over a period of many years, lead me to believe that for the total number of plumbers engaged in the craft, there is not more than nine months' steady work in the year for each. I should be very glad to be shown that this was incorrect. There are certain localities and shops which are nearly always busy, but these shops are generally "full up." There are also a certain few plumbers who will manage to get in eleven or more months per year, but they do not "float" along following the easy beaten path.

This advice will apply to anybody who is "on the square" and who will use a little tact and sense. Let us suppose that a plumber lives in Buffalo, Pittsburgh, or Baltimore, and the work closes down. There is nothing in sight for three months, yet he hears of several jobs going on in Chicago, St. Louis or some other western city. The plumber leaves home and friends and "floats" to the western city.

He may find a job and he may not. The chances are that someone has written and already secured the place. If so, the plumber is out his time and landed in a strange city, with little or no cash. There are always friends, though, but the situation is far from pleasant. Now, would it not been better to have written a letter, and waited for an answer? One would have been at home, meanwhile, and even if there was "nothing doing" at the craft, one might, perhaps, pick up a few dollars at some kind of work, in case the larder was nearly empty.

But only one letter, you say, and perhaps the answer returned that the place was already taken. Well! why not have twenty letters out, and each letter looking for a job?

The reason why many of these letters fail to bring results is that they are so poorly written, poorly spelled, and convey so little information. It is granted that the average plumber is very illiterate, but even though a poor speller and a worse penman, he can get in the ideas and information if he only stops to think.

The trouble is that he is so anxious to get the job that he never stops to reflect that the master may desire a few points of information before sending for the workman. So, eagerly the plumber writes a letter something as follows:

M....., n. y

jones and Brown

dear sirs

do you want a first class A number one plummer i want steddy work and am married, looking for a early repply

Yours

Jim Smith.

Do you think that letter is overdrawn? Ask any master plumber who has been in the business ten years and note his reply. The spelling, lack of periods and capitals might be excused, for many good workmen are woefully deficient along these lines; but what has the boss to draw to when he reads that letter?

One point only. The man is married and the chances are, other things being equal, a married man is liable to be more dependable. Liable, I said. Not always.

The letter cast a shadow of suspicion that the applicant (one Jim Smith) was a first-class workman. He might be, but it would have to be proved.

A letter like the foregoing generally goes into the waste paper basket unanswered, while one like the following will probably draw an answer if there is any work in sight.

M....., N. Y., June 12, 1909.

Jones, Brown & Co.,

K.....y, Mo.

Gentlemen: I desire employment as a plumber. Am a lead worker and can take charge of ordinary work. Can be depended upon. Am married, thirty years of age, eight years a journeyman and am leaving this place because the work is not steady. I am willing to come on trial, letting my work show up for itself.

Yours truly,

James Smith.

Please observe that no mention of "recommendations" is made in the application.

Some masters desire to read letters of recommendation; but there are many who do not, relying upon their ability to size up a man when he is "on the job." There are several other points which might be added to the letter, but enough has been said to show the master that the plumber knows what he is talking about and the last point, offering to "let the work show for itself" is the best point of all, for the master will figure that if the plumber has nerve enough to come on and tackle the job and let his work be the test, this man must have good points. It does not always work out, however, as the standards of work may be vastly different; but at best the right spirit is shown by the offer.

Now, if the plumber out of work has twenty such letters circulating around the country, the chances are that before long a favorable reply may be received and at least a temporary job landed.

I want to state right here, that if I was unable to write a fair business letter, I would spend some of my spare time in trying to acquire the art.

There is not a man in the craft so ignorant, but who, in one year's time, by studying three hours a week, could be able to put forth a fairly written letter of application for a job, and I am sure that this time for practice could be found if one so desired. The pennies, nickels and dimes spent so freely, foolishly and uselessly in times of plenty, if put aside in a little bank, will furnish car fare and render "floating" entirely unnecessary. The boss also has a better opinion of a man who can pay car fare and a man will also respect himself more for being able to do so.

In America, within certain limits, a man has the right to choose his own path in life and manner of living, and the man who has the force to branch out for himself and avoid the manner in which things have been done for years upon years, is the man who will stand a much better show of winning out than those who cling to past usages. The day of the "floater" is nearly past. The mechanical part of the plumbing business is demanding a class of men who can be depended upon. Men who understand something more about the craft than the mere running of pipes and the wiping of joints, and those who have not the wit to see this point, are the very ones who, a mighty few years hence, will find that "the job's closed down. Nothing doing."

A RADIATOR TRAGEDY.

I am afraid I am doomed always to be of the cerebral caliber of the line-back steer when it comes to mechanical affairs. Somehow my intellect is too large and cumbersome to wrap itself gracefully or effectively about so small a problem. I should, by rights, have some one of lesser mind always with me, to attend to the details, just as a Baltimore lawyer of my acquaintance keeps a squeaky-voiced clerk in his office to read the fine print.

As soon as I find some one with less intellect than myself I shall hire him. I should have little trouble hiring any one like that. He would come at a reasonable, not to say cheap, figure, I dare say.

In a hotel at Muscatine, Iowa, the other day I twisted the gimmick attached to the radiator, with the intention of having some heat in my Nova Zemblan booth. The caloric began to percolate very audibly, and for an hour or so the outfit did a splendid imitation of the anvil chorus from "Il Trovatore." This eventually grew monotonous, and I bethought me of a possible remedy.

As a means of quieting the instrument I twisted the other thing at the up-stage end of the radiator until it fell out of the screw hole. Whereupon there began a squirt fest worth traveling whole miles on foot to see. If that stream of water shooting industriously and preoccupiedly through that hole in the back door of the radiator had been turned against the rock of Gibraltar it would have drilled several more port holes into that natural fortress, to say nothing of drilling a few of the garrison off the face of the earth.

It went as straight as a homing pigeon and struck a little alcove in the wall, giving the wall paper a blistered effect as if it had worn a mustard plaster all night long. It deluged the floor and ran in deep little rivers under the drugget.

It was perhaps a trio of moments before I had a lucid thought as to a first-aid-to-the-injured heating plant. In the meantime I had tried, of course, to jam the dinkus back into the hole, but I might just as well have tried to stop Niagara by holding a large-meshed flynet under it. The only change it made was in the general direction of the stream, which gave me on one side and the wall on the other an impartial division of its beautifully sprayed dampness.

As soon as reason got the back breadths of her skirt once more firmly fixed on the throne I grabbed the little wheel business and shut off the power, which helped some.

But I had seen what was wrong. I saw the radiator was filled with condensed steam that needed release before the heat could percolate. Me for the encouragement of percolation. So I gathered up the slop jar and held it in front of the spout, while I released a couple more gallons of water from the machine. That filled, I shut off the pressure while I brought the wash bowl, which was soon full. Then the big water pitcher, which was also quickly running over, then the ice-water pitcher, the tumbler, my leather collar box and an empty ink bottle from the wabbly table—all filled in their turn, while the stream ran merrily on.

I began to be discouraged. Where had all that water been? The radiator didn't look to me as if it would hold more than four gallons, but I had let seven out of it, besides the lake I had put on the floor. Had I tapped the father of waters, which flows near by the hotel?

In despair I shut off the pressure again, went into the hall and 'phoned to the office for assistance. My white flag was fluttering gayly in the breeze that came in through my window from the icy bosom of the Mississippi. I had surrendered, horse, foot, ordnance and navy.

The clerk came up, surveyed with dismay the aquarium-esque appearance of my stall and looked at me blankly, with a piteous question in his eyes.

I explained. I made it clear to him. Then he made it clear to me. With a fixed expression of anguish on his fair young face, he said:

"You darned lunatic; this is hot-water heat!"

—Strickland W. Gilliland in L. H. Drury's "Hits."

GOVERNMENT WORK.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor until 3 p. m. on March 1, 1910, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of an extension to the U. S. Post Office at Hot Springs, Ark., in accordance with drawings and specification.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor until 3 p. m. on Feb. 8, 1910, for the extension, remodeling, etc. (including plumbing, gas piping, heating apparatus, electric conduits and wiring, and standard clock system), of the U. S. Post Office and Court House at Meridian, Miss., in accordance with the drawings and specification.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor until 3 p. m. on Feb. 24, 1910, for the construction (including plumbing, heating, wiring, and standard clock systems) of the extension to the U. S. Post Office at Rock Island, Ill., in accordance with the drawings and specification.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor until 3 o'clock p. m. on Jan. 31, 1910, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of an extension, remodeling, etc., to the United States Post Office at Goldsboro, N. C., in accordance with the drawings and specification.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor until 3 p. m. on Feb. 9, 1910, for the installation of a vacuum cleaning system in the United States Post Office, Court House and Custom House at Spokane, Wash., in accordance with drawing and specification.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor until 3 p. m. on Feb. 17, 1910, for the construction, including plumbing and drainage, of the United States Post Office and Court House at Denver, Colo., in accordance with drawings and specification.

It has been suggested by a would-be humorist that a leek be adopted as the emblem of plumbers' associations.

NEWS FROM THE PACIFIC COAST.

It now looks as though the building season in San Francisco would open very early this year. In fact, the new year opens with the building season already started. The chief factor in the situation aside from the general improvement in business conditions is the orders of the city authorities that all the temporary buildings in the down-town district which were erected immediately after the great fire should be torn down previous to May 10th. This ruling has caused a considerable demand for space in permanent buildings and practically all of the available space has been taken. Now there is a demand for more permanent buildings and plans are already under way for a considerable number of these, and contractors expect that there will be a pronounced revival in brick and concrete building in the down-town quarter.

The A. C. Rulofson Sheet Metal Co., San Francisco, reports that business in corrugated-metal roofing has been good, is good and will continue to be good for some time to come. The mills are filled with orders that will keep the shop running for at least three months. Some orders are being filled now, but the output is limited, and it will take a long time before the company can catch up with the back orders.

D. H. Gulick, western selling agent for the J. L. Mott Iron Works, New York, has gone east for a visit to the factory. He will not return until the end of January.

The Pittsburg Water Heater Co. is furnishing water-heaters in some of San Francisco's largest apartment houses, hotels and office buildings. Among the company's most recent work is the installation of 14 heaters in the Sutter Apartments, one for each apartment, a number in both the new Young Women's Christian Association and in the Metropolitan Life Insurance buildings. The company on the first of the year will open a gas appliance business in Oakland, Cal., in which the Pittsburg water-heaters will be the principal article. H. Brandjen will be the manager of this new store.

Charles M. Charruau, who has been a consulting engineer in this city for a year and a half, will open offices for himself in the Humboldt Savings Bank Bldg. the first of the year. He will be a contracting engineer and will install steam, electric and hydraulic plants in apartment houses, hotels and office buildings. He is now getting ready to tackle large jobs, having considerable capital behind him. He is well known among architects and designers in California, having been employed as consulting engineer on numerous jobs in San Francisco and in the Sacramento Valley.

Many calls have been coming in from heating engineers for the Broomell vapor system of heating to the Russell-Vail Engineering Co., who are the western agents for the Vapor Heating Co., Philadelphia. The company has supplied with the last few months the heating systems in the Elks' buildings in San Francisco, Sacramento, Chico and Stockton, in the St. Mark's Hotel in Oakland, and in the court house in San Rafael. The Russell-Vail Co. contemplates the installation of a number of heating plants in different buildings in San Francisco in 1910.

The Royal Heating Co's. furnace season is now on in full blast, but with them the steam-heating line is on the decline.

Among the visitors in the city during the week are John R. Dugan, Santa Barbara, and Wallace Brown, Pacific Grove, Cal.

The Sergeant Heating Co., Tacoma, has filed articles of incorporation with a capital stock of $10,000. W. P. and E. L. Sergeant and B. S. Douglas are the trustees of this new corporation, which will manufacture heating apparatus and conduct a hardware and merchandise business.

George Miller has bought the interest of Thomas T. Porter in the plumbing business of Miller & Porter, in Porterville, Cal., and will carry on the business himself.

Sealed bids will be received January 14th for the sheet steel pipe for the bringing of the water supply to the Soldiers' Home in Los Angeles county.

The Metal Market

NEW YORK METAL MARKET, JANUARY 4.

Copper, Prime Lake	$14.00
Copper, Electrolytic	13.80
Lead	4.75
Spelter	6.25
Antimony, Cooksons	8.37½
Straits Tin	33.90

CHICAGO IRON MARKET, JANUARY 5.

Lake Superior Charcoal	$19.50-$20.00
Southern, No. 2 Foundry	18.35- 18.85
Northern, No. 2 Foundry	19.00- 19.50

January 5, 1910.

Foundry iron was the same as the week previous.
$1 more a ton than year previous.
Copper was ¼ cent more a lb. than month previous.
¾ cent less than the year previous.

NEW YORK METAL MARKET.

New York.—Dealers' buying prices are as follows:

Heavy crucibled copper	$12.37½	to $12.62½
Light copper	10.87½	11.12½
Plumbers' cocks and faucets	9.50	9.75
Heavy lead	4.45	4.60
Tea lead	4.10	4.20
Solder joints	6.75	7.00
Mixed pewter	....	21.00
Block tin pipe	32.00	33.00

CHICAGO OLD METAL MARKET.

Dealers' buying prices are as follows:

Clean heavy copper and wire	$12.25
Light copper	11.00
Heavy composition	11.75
Heavy yellow brass	9.00
Light brass	7.00
Heavy lead	4.25
Tea lead	3.70
Block tin pipe	30.00

THE PIG TIN MARKET.

The market is cornered in London and prices are advancing rapidly. A syndicate of English and French speculators have, apparently, secured 6,000 tons out of 8,000 tons of tin available in the next three or four months. In their operations they have been aided by a constantly increasing demand from consumers here, and, in consequence, have been able to manipulate the market to suit their own convenience. In America we consume over 40 per cent of the world's production of tin, but we are the "ultimate consumer;" the price is fixed in London and the bill is paid in the far East. Whether the syndicate will undertake to demand 40c. or more for the metal is hard to tell. Having obtained 44c. three years ago, they will probably try to see if they cannot get a higher figure this time. The price of straits tin in 5-ton lots is 33.95c a pound. Smaller quantities are held at 35 to 36c. a pound.

THE PIG LEAD MARKET.

The three rapid advances made by the American Smelting & Refining Co., in December, have put the market in pig lead on a firm basis. The demand is excellent and lead pipe market is very busy. The trust's price for 50-ton lots f. o. b. New York, is 4.70c. Small lots from store at 5¼ to 5¾c.

AN EDITORIAL IN THE WRONG PLACE.

The fact of the matter is the real editorial is on the first page of "Domestic Engineering." The realm of reading matter belongs, however, to the readers and the editor in equal freedom, and it is the prerogative of the two to meet together at any time and place that may be convenient to both. Hence this outburst.

You have noticed doubtless the increased size of the pages of "Domestic Engineering." It is the standard size and not only brings the journal into line with standard publications, but also is intended to forecast the enlargement of the policy of "Domestic Engineering." We want you to get all the business within your territory and right—in other words, all that belongs to you—but we also want you to enlarge your business by all legitimate means.

Did you take stock this year? I presume every one did, and if you did did you place a value on the copy of "Domestic Engineering" for which you have subscribed during the current year? If you did not, you did not take stock. If you once subscribe for any trade journal that endeavors faithfully to represent the interests of the industry it caters to and if you avail yourself of the advantages which such a trade journal offers you can put it in stock at one hundred dollars. The better the trade journal, the higher value you can place upon it. When you took stock, did you place a valuation on your membership in your state or national association? If not, why not?

Do you realize that while you are pottering away, picking up the scrap from underneath the bench and weighing it and trying to find out whether you can add twenty-five cents to your stock account; that if you neglect placing a valuation on the trade journal which comes to you regularly and on your membership in your association which is serving your interests annually, that you are leaving out of consideration two most important factors in the development of your business. The scrap you weigh and place to your credit has no other value than the price you have assigned to it. The journal and the association have values far greater than you are aware of. In the journal you have an organization at your service representing perhaps an investment of from one hundred to two hundred thousand dollars. The journal is a telescope bringing things which are far near to you. The journal is a microscope which enlarges minute things, and yet most important things, and makes them clearly discernible. The journal is a recorder of past events, a scribe of present doings and a prognosticator of things which are to be.

All this recording and prophesying can only be accomplished to the best advantage by the active and spontaneous co-operation of the readers of the journal with its editors.

This brief talk has two objects in view.

First—we want you to wake up to the fact that a live trade paper, like "Domestic Engineering," is not a fungus growth on the industrial tree, but it is the sap which furnishes it with strength, vigor and ability to accommodate itself to all industrial strains and stresses.

Second—having realized the work "Domestic Engineering" has undertaken, the responsibilities which it has assumed, and the goal which it has set, we want you to thoroughly grasp the fact that you are expected to play your part and fulfil your duties in regard to "Domestic Engineering's" progress. You have purchased stock in its career. Your subscription not only places us under obligations to furnish you with a record of the industrial events in which you are interested week by week, but has also been a pledge made by you that you will carry out all the obligations which the subscription has entailed. We are mutually allied for the benefit of the industry. We want your help, your criticism, the news in your locality, and your suggestions.

THE COPPER SITUATION.

New York, N. Y.—The copper market advanced rapidly last week on buying by foreign interests. They, evidently, had been frightened into buying, by the reports of curtailed production here. While no especially large lots were sold, there were several orders for 1,000 to 3,000 tons each and in the aggregate a very respectable tonnage was fatted up. Of course, the mine owners are not giving out any statement that production will be lessened, but there is every evidence that the scheme will be carried through. The price of electrolytic copper advanced from 13½c. to 13¾c. and lake is not obtainable at less than 14c. These figures are for large lots, carloads or over. For small quantities, jobbers are asking 14¼ to 14¾c. for electrolytic and 14½ to 15c. for lake. The exports for December were enormous, amounting to 25,000 tons. A feeling is prevailent, in the metal trade, that copper is soon to come to its own, and by summer the "surplus" may be removed and prices be considerably higher.

BOSTON BRANCH OFFICE DISCONTINUED.

The John T. Young Boiler Co., of Norwich, Conn., on Jan. 1, 1910, discontinued its branch office at 10 Oliver street, Boston, Mass., and will hereafter take care of its trade in that city and its vicinity from the home office at Norwich, Conn.

The Young company feels that it has demonstrated the good points of its steam and hot-water boilers to such an extent that it can dispense with this office, and it has therefore notified the trade to send all communications direct to the home office at Norwich.

THE ILLINOIS CHAPTERS' JANUARY MEETING.

The Illinois Chapter of the American Society of Heating and Ventilating Engineers will hold its regular monthly meeting on Tuesday evening, January 11th, in the rooms of the Architectural Club, 84 Adams St., Chicago. The meeting will be addressed by Dr. Hurdy, Chief of the Health Department of the State of Indiana, and by Dr. Wm. A. Evans, Health Commissioner of Chicago, the subject being "Ventilation of Public Buildings."

This will no doubt be an exceptionally interesting meeting, and members of the heating trade are invited to attend.

BUT WHOSE?

No man was rich enow, she said,
In all the world to mate her,
Crœsus' wealth was but a mite
And Standard Oil small 'tater,
Castles with their titled earls,
Lands ad infinitum,
Mansions fair, jewels rare—
Forfend that I recite 'em!—
All, all, she scorned and turned away
From thousands who besought her,
"I've wealth beyond your dreams," said she,
"I am a plumber's daughter."

NOW WITH WESTERN PLUMBING SUPPLY.

Western Plumbing Supply Co., Chicago, has secured the services of W. A. Crossin, formerly connected with the Western Roofing Supply Co. Mr. Crossin enters upon his new duties today, Saturday, January 8th. He will cover Indiana and Michigan.

An Analysis of the Plumbing Codes of Thirty-five of the Principal Cities in the United States*

By Thomas S. Ainge, Sanitary Engineer, Michigan Department of Health.

(Written Expressly for "Domestic Engineering." All Rights of Republication Reserved.)

With but one exception, each of the several codes contains some provision relative to the termination of the soil or waste pipes above the roofs, but the specifications relative to the locations of the extensions and their height above the roofs are very far from being uniform.

In but one instance do the codes require the extension to be above the highest roof of the building. In three codes, no height is specified; and in the balance of the codes, save two, the specifications range from 12 inches to 12 feet above the roof, probably meaning any part of the roof through which it may be most convenient to pass the stacks. In several codes, the requirements relate to the height of the stacks above adjacent windows, and other openings for ventilation; and in others, to the distance of the stacks from such openings, the latter varying from 10 to 20 ft. In one code, the extension is to go as high as the inspector may require; and in one, no specifications whatever are given relative to this question.

Very little is said in the codes relative to the extensions of waste pipes above the roofs, and this is probably due to the fact that, as a rule, these extensions are connected with the soil pipes before the latter pass through the roofs.

Enlargement of Soil and Waste Pipes Before They Pass Through the Roof.—For the purpose of preventing the reduction, by hoar frost, of the area of the extensions below that of the main pipes, in climates where the temperature falls below the freezing point, it is advisable to enlarge the extensions of all pipes connected with the sewerage system before they pass through the roofs, those of less diameter than 4 inches being enlarged to that size, and those of 4 inches and greater being enlarged one size. This provision is properly made in but one of the thirty-five codes; and in nineteen of the codes no specifications whatever are made relative to this point. In seven codes, the smaller pipes are taken care of by the requirement of a minimum of 4 inches for all extensions above the roofs. In two codes, the pipes are to be increased one size, but no minimum is specified. In one code, the soil pipe is to be one size larger, but no specifications are made relative to waste pipes. In one code (New Haven) the absurdly small minimum of 2 inches is specified for waste pipe extensions, but no provision is made for the soil pipe extensions. In one code, the enlargement is to be made when trap vents are connected with vertical soil and waste pipes. In one code, 3-inch pipes are to be increased to 4 inches, but no provision is made for other sizes. In one code (Minneapolis), the extensions above the roofs are to be encased in a pipe at least 1 inch greater than the soil pipe.

Accessibility.—For the purpose of inspection and repairs, it is essential that the main soil and waste pipes be exposed to view, or be placed in recesses with movable covers, and if this is not made a requirement in a plumbing code, the pipes will probably be placed in partitions, and sometimes in ventilating flues or smoke flues.

In eight of the codes, the pipes are to be exposed to view or placed in recesses or reveals with movable coverings; and in six codes, this provision is to be made whenever possible or practicable. In nineteen codes, no provision whatever is made for placing the pipes where they will be accessible. In one code (Minneapolis), the pipes may be run in heated flues, the object and wisdom of which is not to be used where the pipes are to be concealed.

FIXTURE TRAPS.

The specifications relative to fixture traps are shown in Exhibit VIII.

Location.—For the prevention of foul odors from the accumulation of grease and other substances capable of decomposition, on the inside of the waste pipes of sinks and other fixtures into which foul wastes may be discharged, it is important that each trap be set as near to its fixture as possible. This is specified in 33 of the codes under consideration, but in 2 codes no mention is made as to the location of such traps.

Of the codes in which a limit is placed upon the distance between the trap and its fixture, three codes specify one foot, and eight codes two feet, as the limit. In the Washington code, the trap must not be further from the fixture than 12 times the internal diameter of the horizontal waste, measured between the center of crown of trap and center of vertical waste. In the Worcester code, in the case of range fixtures, the trap must not be more than three feet away. (A proposed amendment to this code fixes the limit for sink traps at one foot and all other traps at three feet.)

Sizes.—The sizes of traps are usually determined by the sizes of the outlet openings of the fixtures to which they are to be attached; and while there are conditions under which departures from this method may be considered advantageous, such departures should be regulated by the board, or individual, having jurisdiction over plumbing work; and then only after it has been determined, by careful inquiry or tests, which sizes will afford the best scouring effect and the greatest measure of safety against siphonage.

In the codes under consideration, the sizes of traps for plumbing fixtures in general are specified in but 9 instances, partly specified in 10 instances, and not specified in 16 instances.

In the codes in which the sizes of traps of any fixtures are specified, with the exception of the specification for water-closet traps, which is 4-in. in every instance, there is a considerable difference in the specified sizes of traps for almost every class of fixture, as may be seen by the following summary of sizes and the number of times they are specified in the codes:

Slop sink or hopper: 2 to 3-in. trap, 1 instance; 1½ to 3-in. trap, 3 instances; 2-in. trap, 5 instances.

Bath tub: 4-in. trap, 3 instances; 3-in. trap, 3 instances; 1½-in. trap, 5 instances.

Laundry tub or wash tray: 2-in. trap, 6 instances; 1½-in. trap, 4 instances.

*The first four installments in this series of articles were published in the issues of May 29, September 18, October 9, and November 6, 1909. These back numbers can be obtained for 10 cents a copy. During the publication of these articles, changes are liable to be made in some of the codes, and the author will be greatly obliged if those who have jurisdiction over plumbing in the cities under consideration will notify him of any changes which may be made and send him particulars of the same.

EXHIBIT VIII—FIXTURE TRAPS

LIST OF THE THIRTY-FIVE CITIES AND THEIR INDEX NUMBERS.

Every black number in this exhibit stands for a city and shows that the specification after which it appears applies in that city. 5 stands for Chicago: 35 for Worcester.

1. Allegheny, Pa.
2. Baltimore, Md.
3. Boston, Mass.
4. Buffalo, N. Y.
5. Chicago, Ill.
6. Cincinnati, O.
7. Columbus, O.
8. Denver, Col.
9. Detroit, Mich.
10. Fall River, Mass.
11. Indianapolis, Ind.
12. Jersey City, N. J.
13. Kansas City, Mo.
14. Louisville, Ky.
15. Milwaukee, Wis.
16. Minneapolis, Minn.
17. Newark, N. J.
18. New Haven, Conn.
19. New Orleans, La.
20. New York, N. Y.
21. Omaha, Neb.
22. Paterson, N. J.
23. Philadelphia, Pa.
24. Pittsburg, Pa.
25. Providence, R. I.
26. Rochester, N. Y.
27. St. Joseph, Mo.
28. St. Louis, Mo.
29. St. Paul, Minn.
30. San Francisco, Cal.
31. Scranton, Pa.
32. Syracuse, N. Y.
33. Toledo, O.
34. Washington, D. C.
35. Worcester, Mass.

Location of Fixture Traps.

As near as practicable to fixture:
2-3-4-8-9-10-11-12-13-16-20-21-23-25-27-28-29-30-32-33.

As close as practicable to fixture, never more than one foot away: **1-24-31.**

As close as practicable to fixture, never more than two feet away: **5-7-15-17-19-22-26.**

Not specified: **6-14-18.**

As near fixture as possible. For the purpose of obtaining a directly rising vent, a fixture trap under a small fixture may be placed not further than 12 times the internal diameter of a horizontal waste from a vertical stack waste, measured between the center of the crown of the trap and the center of the vertical waste:—**34.**

As near fixture as possible. In case of range fixtures, trap must not be more than three feet away. (A proposed amendment to this rule fixes the limit for sink traps at one foot and all other traps at three feet from fixture.)—**35.**

Sizes of Fixture Traps.

Not specified, or not fully specified:
3-4-5-6-7-8-9-10-11-13-14-16-17-25-26-28-35.

Water closets, 4 in.: **1-2-12-20-22-24-31-33.**

Outside water closets, 4 in.: **21.**

Slop sink, 1½ in. to 3 in.: **1-24-31.**

Slop sink, 2 in.: **12-22-30-33.**

Slop sink, 2 in. or 3 in.: **19.**

Kitchen sinks, 1½ in.: **1-12-18-19-24-31-33.**

Kitchen sinks, 2 in.: **2-20-22.**

Bath tub, 1½ in.: **2-12-19-20-22.**

Bath tub, not less than 3 in.: **1-31.**

Bath tub, 4 in.: **33.**

Bath tub, drum trap, 3 in.: **24.**

Bath tub, drum trap, 4 in.: **1-31.**

Wash trays, 1½ in.: **12-18-19-33.**

Wash trays, 2 in.: **1-2-20-22-24-31.**

Urinals, 1½ in.: **1-19-24-31-33.**

Urinals, 2 in.: **2-12-20-22.**

Basins, 1¼ in.: **1-2-19-24-31-33.**

Basins, 1½ in.: **12-20-22-33.**

Slop hopper, 2 in.: **30.**

Dentists's cuspidors, 1½ in. (none to be less than 1½ in.): **30.**

Not more than one size larger than waste pipe: **23.**

Not less than branch wastes: **29.**

Same size as branch waste, minimum, 1¼ in.: **32.**

To be of same size as waste, except that a 1½ in. trap may be connected with a 1¼ in. waste. Minimum for lead traps, 1½ in.: **34.**

Depth of Seal.

Not specified:
1-4-6-8-9-10-11-12-13-14-15-16-18-20-23-24-25-26-27-29-30-31-33-35.

At least 1¼ in.: **21-28-34.**

At least 1½ in.: **2-5-17-22.**

Not less than 1½ in., except for water closet or slop hopper: **32.**

At least 2 in.: **19.**

Not less than 2½ in.: **7.**

For non-siphon traps, not vented, not less than 4 in: **3.**

Tests for Fixture Traps.

Not specified:
1-2-3-4-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-27-28-29-30-31-32-33-34-35.

Not specified except for certain water closet traps: **5.**

For anti-siphon traps only: **26.**

Cleanouts for Fixture Traps.

Fully specified:
2-7-12-17-19-20-22-23-26-29-33-35.

Not specified:
3-4-6-9-10-11-16-18-25-27-28-30-34.

Specified for bath tubs and refrigerator wastes only: **5.**

Bath tubs and wash trays only: **8.**

For outside water closet and drum traps only: **21.**

Prohibited Traps.

Not specified:
1-2-3-4-6-8-10-13-14-16-27-28-34.

Bell: **5-9-30.**

Cast-Iron: **15.**

All except approved siphon traps: **11.**

Bell, Bottle, D., having movable parts, or concealed interior partitions. Earthenware trap with vent horn.—**7.**

That are not self-cleaning; that have interior mechanism or interior partitions to form the seal; porcelain traps having vent horns; brass or other traps having union stuffing boxes or slip joints between water seal and drain; bell traps.—**12.**

Having interior chamber or mechanism; earthenware traps having vent horns.—**17.**

"Sanitas" traps may be used by permission.—**18.**

All other than S or P traps with 2 in. seal, except by permission; also those with trap screws under floors.—**19.**

Earthenware traps with vent horns, Mason's, cesspool, bell, pot, bottle, D, not self-cleaning or having interior chamber or mechanism.—**20.**

Bell-cesspool except when another trap is placed beneath and properly ventilated; drum traps with long extension vent couplings.—**21.**

Mechanical traps, except with approval; earthenware traps with vent horns.—**22.**

All that are not approved by Board of Health; earthenware traps with vent horns; those which depend on interior partitions.—**23.**

Board of Health may designate what may be used.—**24.**

Where vent pipes are not used, traps must be approved by Inspector.—**25.**

Anti-siphon which have not been tested and approved by Plumbing Board; bell; those which have covers, handholes, or cleanouts which are held in place by tugs or bolts.—**26.**

Earthenware traps with vent horns.—**29.**

Where no vent is possible, Board of Health shall designate kind to be used.—**31.**

Those whose seal depends on an interior metallic partition or a mechanical movement.—**32.**

All which have not been approved by Inspector of Buildings.—**33.**

All those depending on secret partitions to form a seal and the trap cover with putty connections.—**35.**

Kitchen sink: 2-in. trap, 3 instances; 1½-in. trap, 7 instances.

Wash basin: 1½-in. trap, 6 instances; 1¼-in. trap, 7 instances.

Urinal: 2-in. trap, 4 instances; 1½-in. trap, 5 instances.

In one code, the size of trap for a sectional lavatory is given as 1½-in.

In one code, the size of trap for a dentist's cuspidor is given as 1½-in.

In the Washington code, it is specified that a 1½-in. trap may be used on a 1¼-in. waste pipe.

Depth of Seal.—For the prevention of the lowering of the water level in a trap by siphonage, back pressure, or evaporation, to the point where the seal would not be a barrier to the passage through the trap of sewer air, a fixed and safe depth of seal for each and every style and size of trap should be determined, and specified in each plumbing code. This is particularly necessary in the case of what are known as siphon traps of the S and P variety.

In the codes under consideration, a depth of seal is specified in but 11 instances; and, in this particular, there is the usual lack of uniformity. Thus, in 1 code, a depth of 2½-in.; in 1 code, a depth of 2-in.; in 5 codes, a depth of 1½-in.; and in 3 codes, a depth of 1¼-in., is specified. In 1 code, a depth of 4-in. is required for non-siphon traps which are not to be vented.

Trap Tests.—It is very essential that the use of traps which are not to be vented be limited to those which have been subjected to a test, corresponding in severity to the siphonic action which such trap would be subjected to when in actual use; and, until each and every non-siphon trap in the market has been tested by some recognized authority and the results of the tests made public, apparatus for the testing of traps should be in the possession of every department having jurisdiction over plumbers' work.

In the codes under consideration, provision is made for the testing of non-siphon traps in but two of the cities represented, viz., Chicago and Rochester; and the tests in the former city have reference only to traps for water-closets which are not to be vented.

A detailed description of tests for resealing and non-siphon traps, which are to be placed at certain distances from a soil or waste-pipe or house-drain, is given in the plumbing code of the city of Cleveland; and an illustration of an apparatus for the testing of non-siphon traps, which was first published in "Modern Sanitation," may be found in "Domestic Engineering," November 16, 1907.

Cleanouts.—As every trap is, more or less, a filth-arrester, the frequent cleaning of traps is essential to the proper working of any system of plumbing. Many of the traps in the market are provided with access-openings, but the specification of such openings in every trap should be included in every plumbing code.

In 13 of the codes under consideration, provision is made for cleanouts on all traps; and in 12 codes, cleanouts are not specified. In 7 codes, cleanouts are specified for the trap of the bath-tub; in 1, for the traps of the bath-tub and refrigerator; in 1, for the traps of the bath-tub and wash-trap; and in 1, for drumtraps and the traps of outside water-closets.

Prohibited Traps.—In a locality where the testing of traps is carried out, all traps which do not stand the test will, of course, be prohibited. There are, however, certain traps which should not be permitted to be used under any conditions whatever, as Bell traps (frequently designated cesspools); D traps; Mason's traps; earthenware traps having vent-horns; all traps which are not self-cleaning; traps in which the seal is formed by concealed interior partitions; traps which depend for their action upon movable parts; and traps having covers, hand-holes, or cleanouts, which are held in place by lugs or bolts.

In 8 of the codes under consideration, the usual prohibited traps, or a majority of the same, are used; in 9 codes, 1, or a small portion only, of the usual prohibited traps are named; and in 14 codes, prohibited traps are not named at all. In 1 code, it is stated that the Board of Health may designate what traps shall be used; 2 codes provide that, where vents are not used, the traps must be approved by the governing body; and in 1 code, it is stated that Sanitas traps may be used by permission.

(To be continued.)

NORTH AND WEST SIDE MASTER PLUMBERS' ANNUAL BALL.

Chicago, Ill.—The North and West Side Master Plumbers' Pleasure Club will hold its annual reception and ball at the Northwest Hall, corner of North and North Western Aves., on Wednesday evening, Jan. 19, 1910. Master plumbers from all parts of Chicago are cordially invited to attend this event which will no doubt be the leading social affair in the local trade this season. The arrangements for the event are in the hands of the following committee: E. J. Benning, chairman; Charles C. Breyer, E. C. Wagner and Peter Feltman.

BRONX MASTER PLUMBERS ELECT OFFICERS.

New York, N. Y.—At the annual meeting of the Bronx Branch of the Master Plumbers' Association of New York City held this month the following officers were elected for the ensuing year: William J. Flynn, president; Frank A. Ten Brook, vice-president; David Durie, Jr., 246 Echo place, secretary; Walter Wilcox, financial secretary; Stephen H. Welch, treasurer; Ossin Johnson, sergeant-at-arms. The following delegates were elected to represent this branch in the New York City Association: W. J. Flynn, Joseph Thiess, David Durie, Jr., Stephen H. Welch and F. A. Ten Brook.

KANSAS CITY HAS NEW PLUMBING CODE.

Kansas City, Mo.—The ordinance prepared by the master plumbers, steamfitters and drain-layers several weeks ago came back to the city council from a committee at last week's meeting, covered with many amendments that it was hard to detect the original document. In all 21 amendments were added to the original ordinance, and it was passed as amended. The ordinance provides that before plumbing, steamfitting or drainlaying can be done in buildings or dwellings the workmen must secure certificates of competency duly signed and issued by a board of examiners. Examinations are mandatory at least once a year and the applicant for a certificate must pay $1 for it and an additional fee for a license.

ROCHESTER TO BUILD FOUR COMFORT STATIONS.

Rochester, N. Y.—The Mayor's ordinance calling for the erection of four public comfort stations was passed by a unanimous vote at the meeting of the city council on Tuesday evening, December 29. The sites recommended for the stations are at Convention Hall, No. 9 School playground, Hartford St. playground and No. 36 School playground. City Engineer Fisher has already had plans drawn for the stations at Convention Hall and No. 9 School playground; $15,000 are available for this purpose at the present time and more will be appropriated at an early date.

Carnegie, Pa.—P. A. Golden, 25 Kismet St., Carnegie, has been awarded the contract for the installation of a hot-water heating system in William Langor's building.

Some Heating Questions—III*

How to Estimate Upon a Job.

By Charles B. Starkey.

Among several factors which cut a feature in the heating business is the untrained, unwise, bull-headed bidder who is resolved to have the work at any price in order to keep things moving and who keeps on moving affairs in this manner until he moves on. Such a man may be constantly the "low bidder" from either ignorance or sheer spite, but in either case the result is, eventually, the same. He finally goes down and out, and not only that, but drags with him any who are unwise enough to enter the lists and try to get work away from this foolish master. We are here in this world to make a living, and it may be set down in your note-book of events that every man is entitled to a reasonable profit upon the work he performs in assisting the world to wag on its way around the sun.

I stated in the first article that the master could find out how much his jobs had been costing him per foot, and, quickly estimating the amount of radiation necessary to heat the house, he would be enabled to give a fairly accurate estimate upon short notice as to the amount the job would cost. I am not going to "hedge" upon that method, for I know that a few people are of such a nature that they require exactly that sort of treatment. But there is a joker in the deck and here it is: Suppose, in your haste, you make a mistake in figuring? There is only one thing to do and that is to put the job through and be sure the next time. As a general thing, however, it is better to take time and make out a full estimate upon some reliable estimate blank, as then there is small chance for a mistake to occur, provided one is sensible enough to make fair figures upon the job. When I first began this business I had an old rule drilled into my head, and I want to state that, in spite of all the rules to the contrary I have since learned, and knowing full well wherein the old rule is weak, I sometimes find myself going back to it for comparison.

One thing I wish to state in regard to this ancient practice, and that is that I never knew of a room that failed to heat where the radiation was figured after that fashion. However, a man using that amount of radiation, day in and day out, would be regarded as a philanthropist.

This old rule to which I allude is the "40 to 1" rule, which is, as I suppose everybody well knows where one foot of heating surface heats forty cubic feet of space in the room. The "55ths" rule and many others have been quoted too many times in the columns of "Domestic Engineering" for it to be necessary to take space by repeating here and besides I am not dwelling upon any particular rule in this article. The point I am after is called judgment, and it is the most needed and least used of any other point in the plumbing and heating business.

Were I called upon to give one rule to the masters which would apply to all classes of work in all parts of the country it would be this: Put in the job exactly the same as if it were in your own house and you had to pay for it and use it yourself.

That rule covers the whole subject, ignorance, greed, carelessness and good work, first-class material and proper estimating are all handled without gloves if a man will only apply that rule to each job he contracts.

For instance, if a master was to invest $1,000 in a steam job to heat his own house and was not exactly sure about the manner in which he had figured the radiation you can bet that he would find out somehow before he coupled up the radiators. He would not put himself to the trouble of tearings things loose in his own house; but, strange as it may seem, he will say, "Let's see, that room in Brown's house calls for 75 feet. How did I figure it? Why that room is not exposed much. Sixty feet will heat it all right." So "sixty feet" goes and the room heats to about 64 in zero and a big howl comes along the telephone wires from Brown, who swears he's freezing and threatens all kinds of trouble unless matters are fixed up at once. Does this happen? Did you, my fitter friend, ever know of many cities in which such events did not happen? I make the assertion that a master would not subject his own personal job in that manner and state that it is a foolish and venturesome practice for him to do it on a job of his neighbors; for that neighbor is going to object and act in a somewhat peevish manner.

If I were making an estimate of a heating job from the blue prints, before I completed my figures I should carefully read the specifications concerning the construction of the house, the material to be used, etc. I would consider the exposure and also I would bear in mind the reputation of the contractor who was to build the house. Does he do good or merely indifferent work, or is he entirely dishonest and a man who will skin the job at every possible point? If the latter, you can depend upon it that there will be dozens of places in the cellar wall where the air can get in, and also the windows and doors will admit enough air to queer your figuring if some extra allowance is not made. "Why that's nothing to me," some one says, "I am not building the house." Yes, my friend, your statement is true, but you certainly are guaranteeing to heat that house to 70 deg. in zero weather, and you must put in enough radiation to do the business, or get left when zero appears. Therefore, why lie to yourself and try to believe that 20 per cent less radiation will do the work, when right down in your heart you know that it will not and that you are sure to have trouble. If, by good luck and extra sharp collections, you succeed in getting your money for the job before it is thoroughly tested, and you refuse to make good, you have a law suit upon your hands and have made an enemy who will harm your business. Twenty heating jobs may succeed and very little will be said, but let one job fail and everybody knows it.

As for the amount of radiation that must, upon general principles be figured, this country is so large and contains so many varieties of climate that one must use his common sense.

Suppose that one figured the same amount for two jobs, one located in North Dakota, while the other job was installed in Florida. What would be the result?

If an ordinary amount of radiation were figured the Dakota job would be mighty uncomfortable when the mercury was 40 below zero, while the Florida plant would probably furnish too much heat, except when they had

*Previous installments of this series appeared in our issues of Dec. 4, 1909, and Dec. 18, 1909.

freezing weather, which sometimes happens down there, and then everybody is chilled, for freezing weather does not look good to the extreme Southerner.

After the radiation, pipe, valves, boiler, pipe covering, bronzing, etc., are figured there are other things to be thoroughly considered before the estimate can be rendered. The labor for instance. This is a somewhat uncertain item and one where the master must depend upon the honesty and skill of the fitter. I can give a hint here. Treat your fitters as though they were human and really did have a few natural feelings. You will be surprised at the increase in the amount of work turned out.

The cost of the job is not found yet, for you have yet to add a certain percentage to cover the running expenses of the business. This per cent has been variously estimated at anywhere from 15 per cent to 25 per cent, and each master must find this out for himself.

We have now the cost of the job provided all goes well. How much profit do you desire to make on the job?

Decide this matter and foot up the items. You can then tell the customer at a convenient opportunity the sum for which you will do the job and not cut the price one red cent.

A TIP TO THE WIDE-AWAKE PLUMBER.

By "Live Wire" Blackiston.

Owing to considerations of safety, economy, convenience, underwriters' rules and various other reasons, nine-tenths of automobile owners are installing storage tanks for gasoline.

These tanks always are placed some distance from the point of outlet, the gasoline being piped to the garage. The efficiency of gasoline depends entirely on the quantity of gas retained by the fluid, and since it vaporizes rapidly on the slightest exposure to the atmosphere, the tank and all pipes and connections must be absolutely air-tight, making compulsory good workmanship in installing the outfit.—Enter The Plumber.

Of course all of the usual pipe fitting is done by a plumber, but—and herein lies the above-mentioned "tip"—what's the matter with the plumber acting as salesman for the whole outfit, tank and all? He sells hot water and other types of tanks, why not air-tight gasoline tanks?

There is a good profit in them and a sale of this sort often leads up to a patronage which is most desirable, since the average automobile owner is fairly well supplied with this world's goods.

The sample tanks do not take up any more space in a showroom than the ordinary closet fixture, and they require very little demonstration. The convenience of ordering a tank and connections complete from one dealer is a potent argument and one that need not be dwelt upon here.

The only question for the plumber to decide, is the sort of tank to handle. There are various kinds in the market, but it is not the purpose of this article to boost any of them. It is suggested, though, that the tank selected be one so constructed that leakage is impossible—the seamless kind answers this requirement. Riveted tanks may or may not fill the bill—experiments along this line may prove costly. The pump is a secondary consideration, as any good pump will do the work if the tank and piping are the right sort, although good practice suggests the use of the simply constructed air-pressure pump. Valves in suction pumps sometimes deteriorate, through contact with the gasoline.

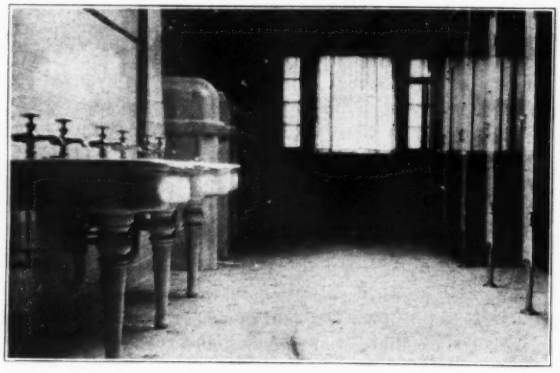
The proposition looks good, and it is to be hoped that the plumber who has an eye open for new business, will corral, rope, tie and brand this opportunity as his own.

MANHATTAN PLUMBERS HOLD ANNUAL MEETING.

New York, N. Y.—The annual meeting of the Manhattan Branch Association of Master Plumbers was held on December 21 and the following officers were elected for the ensuing year: President, B. F. Donohoe; vice-president, T. S. Cochrane, Jr.; secretary, Geo. H. Creasy; financial secretary, James Smith; treasurer, Thos. J. Cummins; sergeant-at-arms, Morris Jarcho; marshall, Francis McNamara. Board of trustees: T. A. Hill, chairman; Frank Reynolds, Philip Brady, Cuno Muller and Isaac J. Brown. Representatives to Greater New York Association: James P. Knight, T. S. Cochrane, Jr., Isaac J. Brown, James Smith, T. J. Cummins, T. A. Hill, B. F. Donohoe, Frank Reynolds, Ed. J. Brady, Cuno Muller, John Smith (No. 1), F. B. Lasette, Aug. Hansen, Geo. H. Creasy, B. A. Buge, F. J. Fee, John Renehan, T. J. Toumey, Jere. J. Delany, Jere. L. Murphy, J. J. Falihee, W. P. Smale, Ed. Hurley, A. E. Jackson, Thos. J. Ivans, J. Rossman, J. T. McMahon, Fred Schumann, Hugh Taylor, Chas. A. Walsh, M. J. O'Brien, Philip Eich, J. J. Barth, John A. Long, Wm. Thompson, J. J. Kennedy and Chas. Murphy.

AN UP-TO-DATE TOILET ROOM.

The accompanying illustration shows part of one of several hotel toilet rooms, recently installed in the new and modern Tacoma Hotel at Tacoma, Wash., by Ben



Type of toilet rooms installed in the new Tacoma Hotel, Tacoma, Wash., by Ben Olson, of that city.

Olson, a successful plumbing contractor in that city and a prominent member of the local master plumbers' association. This toilet room is a striking example of elegance and sanitation combined.

PLUMBING INSPECTOR AVERY MAKES HIS ANNUAL REPORT.

Holyoke, Mass.—Plumbing Inspector F. L. Avery has made his annual report for the year just ended and it calls attention to the difficulty which the master plumbers of the city have experienced in securing sufficient help to carry on their contracts. He also calls attention to the growth of building operation in Holyoke during the past year which he says has taxed the resources of his department to the utmost to give necessary inspections. The scarcity of help has made it necessary in many instances for the master plumbers to work more than one helper with each journeyman plumber which has caused some dissatisfaction. He states that there is evidence also that some property owners have had joints wiped and other minor work done by "handy men." In the opinion of the inspector this is wrong in principle and many complaints have reached his office as a result. During the year 3,618 inspections of old and new plumbing were made. The report of the plumbing examiners of the city show that twelve applications have been received for journeymen's certificates, six of whom were found qualified.

ADVANCED AND SIMPLIFIED PLUMBING.*

By William Paul Gerhard, C. E., Consulting Engineer for Hydraulic and Sanitary Works, New York City.

Some years ago I delivered at your meeting of health officers a lecture on "Plumbing, the Old, the Modern and Advanced Systems."

The gist of this lecture was the simplifying of plumbing work. In large cities like Boston, New York, Washington and Chicago, any quantity of elaborate and complicated plumbing may be seen. Wherever possible I have always tried to advocate simplicity in arrangement of plumbing work. There has been hardly any advance made since that time, and I shall find it difficult to present any really new ideas. My endeavor will therefore be to emphasize the general and leading principles which form the foundations upon which all systems should be based, and make a further plea for simplicity versus complication.

Plumbing work comprises means and appliances for supplying buildings with water, for removing water fouled by use and for removing storm water from roofs and paved courts and areas. In the following I shall, owing to the lateness of the hour, consider only the removal of the water which has been used in buildings. This removal is accomplished by a system of fixtures, traps, waste, soil and drain pipes, with the necessary vent pipes; these together constitute the house drainage system.

The individual house systems form the units composing together the joint sewer system of a community. To be effective the house drainage system must be correctly laid out and operated properly. Every such system should fulfill certain requirements, which I will state briefly.

1. The house drainage system should remove from the building quickly and completely all liquid wastes, including human excreta, water used for washing and bathing purposes, kitchen water, and sometimes, though not always, the storm water. The removal of the house sewage should be effected before decomposition sets in. It should be accomplished without contaminating the soil, the air or the water.

2. A house plumbing system should be so arranged that under no circumstances will there be an escape of sewer air into any room in the building. This is accomplished by the proper and safe trapping of all outlets.

3. Foul gases, originating in the house pipes, should be diluted, oxidized and thus rendered innocuous. The entire pipe system should be without long dead ends, where the air would stagnate.

These are the three general requirements which every system must fulfill.

I come now to some more specific advice, contained in the following maxims:

1. Each building should have a spearate connection with the street sewer.

Large buildings may require several connections and these are better than one pipe of a very large size.

2. All the drain, soil, waste and vent pipes within the building and up to a point five feet outside should be of heavy cast iron pipe, with lead caulked joints, or of galvanized screw jointed pipe with recessed drainage fittings. No earthenware or tile drains should be allowed within the building.

3. All pipe conduits for sewage should be constructed air and water tight to prevent leakage of sewage and of sewer air.

4. All the horizontal and vertical pipes should be carried as straight as possible. Offsets on vertical vent lines should be made under 45 degrees.

5. On horizontal lines use Y branches, not Tees, for junctions or connections.

6. All the pipe conduits, traps, cleanouts as well as the fixtures, should be kept exposed and easily accessible for inspection or repairs.

7. All the pipe conduits should be of minimum diameter, consistent with volume of sewage or waste water to be carried, because in this way the flow of water is more concentrated and the pipes are flushed out better.

8. All pipe conduits should have good supports, good alignment and a sufficient fall.

9. All soil and vent pipes should be extended the full size to the roof, or even enlarged at the roof to prevent closing of the pipes by hoar frost in cold climates. No pipe above the roof should be less than four inches.

10. The number of vertical stacks in a building should be reduced to a minimum, and this can be accomplished by concentrating the plumbing work and making branches as short as possible.

11. Reduce the number of fixtures and arrange them as much as possible, and as much as is consistent with convenient use, in vertical groups. A single soil pipe may answer for the fixtures on a number of floors.

12. Place plumbing fixtures only in ventilated rooms and confine the plumbing to bath and toilet rooms, to kitchen, pantry and laundry.

There is a question which has been brought up from time to time, and that is whether it is feasible and safe to have stationary wash basins in the sleeping rooms. In general I do not advise it. I think the rules laid down by boards of health should not permit it because there is always a chance of some joints opening up and letting sewer air enter the apartment. Personally, I should not hesitate to have such a basin in my sleeping room, but I should give the plumbing very frequent inspections and tests. With regard to the location of the bathtub and the water closet I would say it is a general American custom to put these in the same room, whereas, in English houses and in many of those in Continental cities the water closet is placed in a separate apartment. For a great many years I have spoken and written against this common American practice which I consider inconvenient, particularly for the smaller houses. In these, it is, in my judgment, very much preferable that the closet and the bathtub be in separate compartments.

13. All the plumbing fixtures should be trapped separately and safely. The trapped waste from one fixture should never pass through another trap before reaching the soil pipe or the house drain.

14. Fixtures should be of non-absorbent material; all sharp corners should be avoided, glazed and smooth surfaces are required. Wood and porous stone should be condemned as unsuitable.

15. Modern plumbing work dispenses entirely and properly so with the former wooden enclosures of fixtures.

16. There are certain pipes in every house which should never be connected to a sewer or soil pipe; for instance, the overflow pipe from the house tank and in particular the wastes from refrigerators or ice boxes. These should drip over a trapped and water-supplied sink.

17. Avoid having in the house any fixture which is not in daily use, as the evaporation of water will soon unseal the trap.

*Read before the Massachusetts Society of Sanitary Officers.

18. Each plumbing fixture should be arranged to empty quickly, like a flush tank. All pipe conduits should be well flushed, and if the grade is slight, special flushing appliances for the house drain should be provided.

These are the leading maxims, which I shall ask you to keep well in your mind. Note also the following summary of requirements:

1. Good and durable material.
2. Good workmanship.
3. Good supports, fall and alignment.
4. Proper junctions.
5. Direct and short runs.
6. Accessibility of all parts.
7. Safe trapping of the fixtures.
8. Perfect ventilation.
9. Powerful flushing.
10. Instant removal of all wastes from the building.
11. Noiselessness in action.
12. Protection against freezing of the plumbing.
13. Prevention of unnecessary waste of water.
14. Simplicity of arrangement, concentration of work.
15. Avoidance of all complicated mechanical apparatus.

These rules should be applied, where the plumbing is in charge of a health officer, to all new work for which plans are submitted to him. They also should be made to apply to inspections of old plumbing work.

Let me mention here one popular fallacy, viz., that "only nickel-plated plumbing work" can be sanitary. I want to assure you that you can have just as sanitary plumbing work if you use iron or lead piping, which can be made to look well by aluminum bronzing, or enamel painting.

The plumbing rules and regulations should be as concise and brief as possible. They should be general and not burdened with unnecessary details. They ought to be progressive in spirit and give the health officer discretionary power in all matters which are, or may seem to be, debatable.

All rules should require the filing and approval of the plans and specifications by the proper party. They should require a notification of the tests and also the actual execution of the tests and the making good of any defects which the tests show.

Not many state board of health have drawn up plumbing rules. For briefness and excellency I endorse the rules which have been issued by your State Board of Health. They were submitted to me for examination and revision, but I hardly found it necessary to add anything to what the rules already embodied.

ROLF-MARTIN CO. SECURES AGENCY FOR SAFETY GAS-VALVE.

The Rolf-Martin Co., Ft. Wayne, Ind., has secured the exclusive agency for Indiana for the sale of the Hasty safety gas-valve, manufactured by the Hasty Manufacturing Co.

NATIONAL TUBE CO. TO IMPROVE KEWANEE PLANT.

The National Tube Co., Pittsburg, Pa., has appropriated $111,000 for improvements on its Kewanee works at Kewanee, Ill. This, with other appropriations, will mean an expenditure of at least $325,000 in 1910 on the fittings and valve works at Kewanee.

NOW WITH THE NATIONAL CLOSET CO.

National Closet Co., 178 West Van Buren St., Chicago, has secured the services of S. A. Owen as traveling representative. Mr. Owen was formerly connected with the Plumbers' Sundries Company, of Chicago.

CUTTING DOWN PIPES.

It often happens that some piping has to be trimmed down, chipped, slotted or reduced in diameter by whatever means is most convenient in the shop. Sometimes a device is rigged according to the plan shown in Fig. 1. This consists of the base of metal, on which the brace A

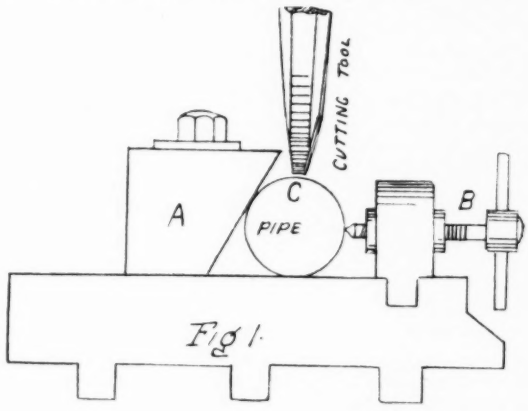


Fig 1.

is bolted to support one side of a pipe. The pipe (C) is held securely in position by the point of the set screw B which is turned into one side as shown. This set screw is studded into a brace and is operated by means of a threaded section and the bar which extends through the head of the shaft. Then when the pipe is properly supported, the ordinary cold chisel is brought into action for purposes of chipping away at the metal until the metal

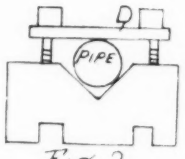


Fig 2

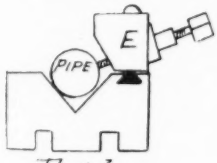


Fig 3

is removed. It is a crude mode of operation, as any one can see. Unless the pipe is previously supported from the interior, with a core of some kind, the shell is liable to be caved in.

In Fig. 2 we show a type of gripping contrivance which is used occasionally for holding on to pipe work in process of overhauling. The base piece is of iron and is grooved. The cap is a flat piece of metal (D) which is set-screwed down tightly on the pipe with a view of sup-

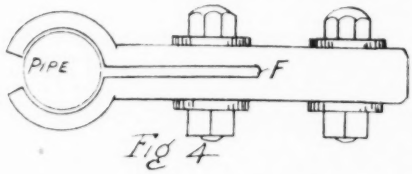


Fig 4

porting the pipe firmly in position during the mechanical work thereupon.

Another style of the cutting-retaining block is shown in Fig. 3, in which the socket-cap E is furnished with a lug-screw for attaching itself tightly to the pipe body in process of work.

Still another style of pipe grip is exhibited in Fig. 4. This consists of the section of steel with a split extending from the bushing along the base to F. Hence the mouth

can be gapped open wide enough to receive the pipe. Then after the pipe is in position, the clamping screws can be turned until the slot is closed and the pipe is thereby held firmly in place for whatever slotting, filling, turning

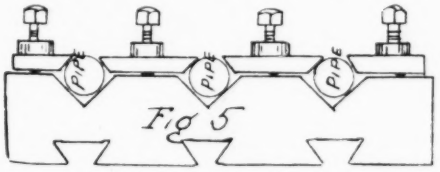


Fig 5

or other mechanical operations may be brought to bear on the pipe wall.

In some cases a number of positions of the same order are required in the one base as shown in Fig. 5. A serial combination of V-shaped grooves is employed. These are cut at regular intervals along the course. Then there

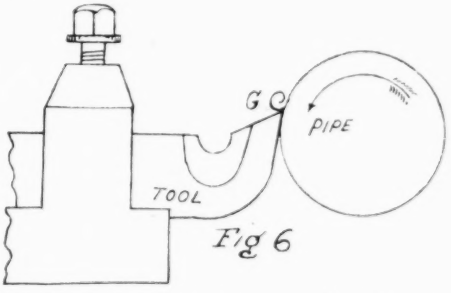


Fig 6

are adjustable clips to fit in between each of the grooves. These clips are operated by the set screws. Hence a number of lines of piping can be held in place for work at one time.

In Fig. 6 is a turning-lathe pipe-cutting tool of consid-

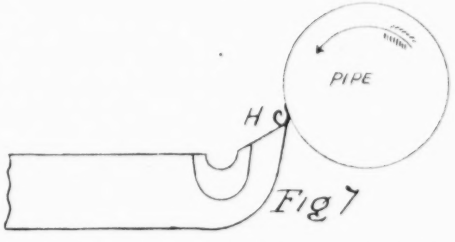


Fig 7

erable usefulness. The pipe is fitted in a revolving head of a common pipe-cutting lathe. The point of the cut tool is adjusted so that there is a proper clearance and effective cutting at G for the removal of the chip. In this example the point of the cutting tool is set too far above the cen-

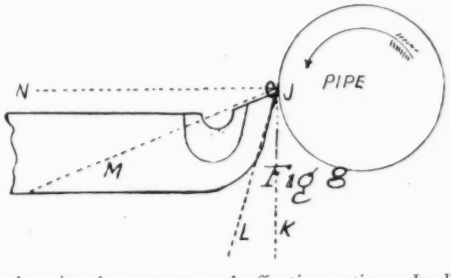


Fig 8

ter of the pipe for proper and effective action. In Fig. 7 the point of the cutting tool is set too far below the proper cutting center. In Fig. 8 the point of the cutting tool is set right. The point of the cutting tool is on level with the low center of the turning pipe in the lathe. The clearance lines can be traced from J to K and L on the lower side and from J to N and M on the horizontal basis.

When you want to prevent the pipe wall from crushing in, due to the exterior pressure of the cutting devices,

Fig 9

Fig 10

you can plug up the interior with rosin as in Fig. 9, or with a soft metal plug as in Fig. 10.

In cutting threads on pipes, you have to avoid going excessively deep, as in the section view of the cut threads

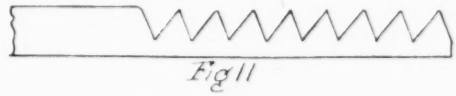


Fig 11

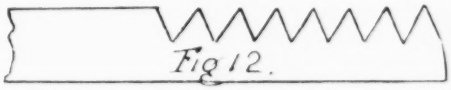


Fig 12.

in Fig. 11, because this excessive cutting will weaken the body metal. Fig. 12 shows the threads cut on a thick body resulting in a solid shell remaining for the supporting of the threads.

CONVENTION DATES.

January 18 and 19, 1910.—Annual convention of the Master Plumbers' Association of Wisconsin, at Sheboygan, Wis. President, Jacob Schuh, 1120½ Vliet St., Milwaukee, Wis.; secretary, I. Toussaint, 1705 Walnut St., Milwaukee, Wis.

January 18, 19 and 20, 1910.—Sixteenth annual meeting of the American Society of Heating and Ventilating Engineers, in New York City. The sessions will be held in Engineering Societies building, 29 West 39th street. Secretary, Wm. M. Mackay, 113 Beekman St., New York City.

January 20, 21 and 22, 1910.—Fifth annual meeting of the American Society of Inspectors of Plumbing and Sanitary Engineers, at Trenton, N. J. Officers: President, Chas. B. Ball, chief sanitary inspector, Department of Health, Chicago; secretary-treasurer, Charles S. McCosker, Mobile, Ala.; vice-president, A. C. Shaver, Pasadena, Cal., and F. W. O'Neil, Joliet, Ill.

January 26 and 27, 1910.—Annual convention of the Illinois Master Plumbers' Association, at Springfield, Ill. Headquarters at the Annex of the St. Nicholas Hotel. President, W. J. Lang, 538 E. Division St., Chicago; secretary, W. C. Haviland, Coulter block, Aurora, Ill.

February 15 and 16, 1910.—Nineteenth annual convention of the Ohio State Association of Master Plumbers, at Youngstown, Ohio. The sessions will be held at Knights of Columbus Hall and headquarters will be established at the Tod House. President, J. L. Riley, 157 McDonough St., Dayton, Ohio; secretary-treasurer, E. C. Ellen, 4714 Central Ave., S. E., Cleveland, Ohio.

The Settlement.

Suitor—"What will your father settle on the man who marries you?"

The Girl—"All the rest of the family, I suppose."—St. Louis Times.

The Line of Argument.

"Father," said little Rollo, "what is the arctic circle?"

"The arctic circle, my son, is an imaginary line bounding a large area of uncorroborated evidence."—Washington Star.

Modern Conveniences for the Farm Home*

By Elmira T. Wilson, C. E.

Formerly Assistant Professor of Civil Engineering, Iowa State College.

The failure to employ modern methods of lightening labor inside the house is a great hardship on many farms. Thoughtfully planned, conveniently arranged and carefully constructed buildings are as essential in the country as in the city. Plumbing is becoming a necessity, not only for comfort and convenience, but even more for health and cleanliness, and the proper disposal of the wastes of the household should not be neglected.

THE WATER SUPPLY.

For domestic purposes the water must be clear, pure and palatable; the essentials being freedom from disease germs, turbidity, color, odor and taste.

Springs and Wells.

Of the various sources of supply springs usually rank first and deep wells next in desirability. The character of the water in a shallow well depends upon its past history and present environment. If it has traveled long distances through the soil without encountering organic impurities or taking up objectionable mineral salts, or if after possible pollution it has been filtered and purified in its travels, its quality is probably excellent. But shallow wells near barnyards or privy vaults should always be regarded with suspicion. It is well to remember that the price of pure water, wherever you go, is everlasting and unremitting vigilance.

The danger of using the ordinary shallow well is known to everyone. To locate a cesspool and a well on the same small piece of ground is almost impossible without contaminating the water. Slop-water of any kind should never be thrown near the well. The top 4 or 5 ft. of the well casing should be laid up in cement mortar to prevent water flowing in without first filtering through the ground. A sewer-pipe or waste-drain near a well is dangerous, because such a pipe or drain is seldom water-tight. If a sewer-pipe must be run near a well, cast-iron pipe should be used.

The carelessness that will locate the barn on higher ground than the well and take no precautions to divert the surface drainage is almost as deplorable as the use of the cesspool or privy-vault. To keep the earth clean in the vicinity of the water supply is of the greatest importance and requires constant watchfulness.

Cisterns.

There are localities where the only available water supply is obtained by storing the water which falls from the roof of the house during rainy weather. In other places the water is so hard that rain water is desirable in the laundry and bathroom.

Construction.

The size of the cistern needed will vary with the size of the family, the length of the dry season, and the number of plumbing fixtures supplied with the rain water. This cistern may be located close to the house for convenience and should be built of good, hard brick, with walls not less than 8 in. in thickness, laid in portland cement mortar. The bottom should be laid with two courses of brick well bedded in the cement mortar. If the water is to be used for drinking or for cooking, a filter chamber should be added by building an 8-in. partition wall after the bottom has been paved. This wall should be built a little higher than the outlet of the overflow pipe. The walls of both compartment should be plastered with a good coat of cement mortar, composed of one part good portland cement and two parts clean, sharp sand, excepting 10 or 12 ins. of the bottom of the partition wall (4 or 5 courses of brick, which are laid together without cement) for the water to pass through. The water from the roof is collected in one compartment and is pumped from the other, the filtering material being put in the first compartment. An overflow pipe should be provided on the side of the cistern which the water enters, the opening of the overflow pipe being fitted with a fine strainer to exclude insects or vermin. A cut-off should be placed on the rain-water pipe leading to the cistern to divert the flow to the outside when necessary, as, for instance, for a short time at the beginning of the rains to exclude the dirt collected on the roof and in the gutters.

The cistern may be built of concrete, and may be either round or rectangular. The round form is the more difficult to build, but it is the stronger. A description of the method of building a rectangular concrete tank is given under "Disposal of Sewage" in a later issue of "Domestic Engineering."

Use of a Pump.

A small force-pump, placed at one end of the kitchen sink, with the suction-pipe reaching to the cistern, is a convenient means of getting the soft-water supply if the more expensive method of using a gravity tank or a pneumatic tank and piping the soft water to the sink, wash basins, and bath tub is not desired. If a gravity soft-water tank is placed in the attic it can have a direct connection with a rain-water leader which will keep the tank full during the rainy season. This connection must be supplied with an automatic cut-off which will send the water to the cistern when the attic tank is full. The force pump can be connected to the tank and used to fill it in dry seasons.

To have a constant water supply in the kitchen and bathroom it is necessary to have some means of storing it under pressure. An elevated tank which will deliver the water by gravity may be used, or a pneumatic tank which will deliver it by air pressure. The labor saved by having the water carried to the house, barn and garden will soon pay for the storage tank, while the value of adequate fire protection and the healthfulness of sanitary plumbing can not be estimated in dollars.

*Prepared and published by direction of the Department of Agriculture, Washington, D. C.

ELEVATED TANKS.

Location of the Tank.

If the gravity system is chosen, the tank for the storage of the water may be in the attic or on an outside tower. If a windmill is used for power, a small tank can be supported 20 to 40 ft. from the ground on the same tower. These tanks can be constructed of wood or of galvanized steel, and of capacity varying from 300 to 2,000 gals. If a larger tank is desired, a tank on an independent tower should generally be used with pipe connections to house and barns. When the storage for the house supply is in the attic, too large a tank should not be used, as water is heavy (62.5 lbs. per cu. ft.) and there is danger of overloading the attic floor unless it has been especially designed to carry the tank.

Kinds, Construction and Cost.

Attic tanks are constructed of wood lined with zinc or lead, of galvanized steel, of cast-iron, and of wrought-iron. Such tanks should always be provided with an overflow pipe to carry off the water if the float valve fails to shut it off when the tank is full. If of iron or steel, a galvanized steel tank pan with a drain connecting with the overflow pipe should be placed beneath the tank to prevent damage to floors and ceilings from condensation of moisture on the outside. The water supply is regulated by means of a float valve which cuts off the inlet pipe when the tank is full enough. The size of the tank will be regulated by the power used to raise the water as well as the amount required by the family. The hydraulic ram or the windmill will require only a small storage tank, as they are so easily set going. If an engine is used, a tank that will hold a two or three days' supply would be more convenient and economical. A closed steel tank, fitted with a water-seal air valve, may be used in the attic with the overflow pipe leading to the stock tank in the barnyard. This insures a constant renewal of the water. There is one farm in Illinois where the water supply is forced to an attic tank and the fall of the surplus operates a water motor for lifting the cistern water to another tank in the attic, and then the surplus water goes to a tank in the haymow of the barn with an overflow pipe to a stock tank in the barnyard. This illustrates how well the head can be made to save the heels.

If all the plumbing fixtures are on the ground floor, the closed steel tank for the cold-water supply can be placed in the kitchen or bathroom. If desired, the entire water supply can be made to pass through this house tank and so the house supply will be always fresh. With a closed tank there is no danger from overflow.

A tank like this, 12 ins. in diameter and 4 ft. high, will hold 24 gal. and cost about $16. An open galvanized steel tank can be made or can be bought ready-made. A ready-made one with a capacity of 100 gal. will cost about $8, while a 500-gal. tank will cost about $16.

PNEUMATIC TANKS.

Sufficient pressure to force a water supply wherever desired in a farmhouse may be secured at all seasons by means of a pneumatic tank built of steel plates and located in the cellar, or in a small building erected over the well, or even buried in the earth if desired. It is superior to an elevated tank because the pipes and tank can more easily be made frost proof in winter and the water will be cooler in summer. It is closed to dust and light and has the additional advantage of resting upon the solid ground.

Principle of Action.

Water is pumped into the bottom of this air-tight tank, and as the water rises in the tank the air above it is compressed. The expansion of this compressed air will force the water through the supply pipes at the bottom of the tank to points where the water is required. The pressure is increased by pumping more water into the tank and decreased by drawing water off. A 15-lb. pressure will raise water to a height of 33 ft., a 10-lb. pressure to a height of 22 ft., etc. The correct amount of air can be supplied and maintained by an automatic air valve, by a pump that forces both air and water into the tank at the same time, or by a hand air valve. The last method is not self-regulating, but if water is supplied to the tank by a hand force pump, it will not require much more attention to regulate the air pressure also.

POWER; COST.

The water can be forced into the pneumatic tank by the same means required to elevate it to a gravity tank, i. e., by a windmill, gas engine, hot-air engine, hydraulic ram, or by hand. From 10 to 20 minutes a day with a good hand force pump will furnishe a moderate supply. If more than 100 gal. a day are required, it is better to use some other means of pumping. If an engine is used, a large tank is more economical, and 20 minutes' pumping twice a week should furnish the supply. With a windmill an automatic regulator should be used, which will throw the windmill out of gear when the pressure reaches a given amount and start it again when the pressure is relieved.

The prices vary with the different manufacturers. A tank 30 in. in diameter and 10 ft. long, which would supply the needs of a family of five, is listed at from $101 to

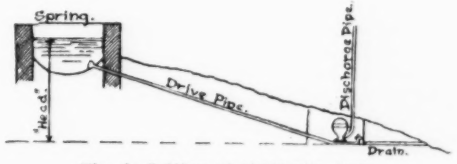


Fig. 1—Setting of Hydraulic Ram.

$138 (subject to discount). The expense for repairs to an outfit like this is very slight and the time required for pumping varies with the power used.

Neighbors can frequently combine and put in one large plant for supplying water to several houses. This decreases the cost to the individual and gives a greater pressure in case of fire. The greater the horizontal distance the water is carried the larger the pipes should be to lessen the loss of pressure by friction.

POWER AVAILABLE.

What will be the most convenient and economical means of forcing water into the storage tank depends upon the situation in each case. The source of the supply, the amount required, the need of power for other purposes, the available fuel, and the cost of labor will all have a bearing on the matter. The hydraulic ram and the windmill have the advantage of operation without fuel, but the ram requires at least 18 in. of waterfall, while with the windmill the daily supply of water is not always subpect to control. The gas or hot-air engine requires fuel and attendance, but the supply is more easily regulated.

The Hydraulic Ram.

The hydraulic ram (Fig. 1) can be used to fill the storage tanks if the source of supply is a spring, flowing well, or running stream from which enough fall to supply the power can be obtained. Its use is practicable with a fall of only 18 in. but with greater heads water can be forced to higher elevations and to longer distances. The head

can be increased by damming the stream or by sinking the ram into a pit, if a drain can be secured to keep the pit free from water. The relation between the height of the spring, or source of supply, above the ram and the elevation to which the water is to be delivered determines the proportion of water raised to water wasted. It is not economy to increase the fall more than is necessary to supply the required amount of water, as the durability of the ram will be lessened. The amount of water procured by means of a ram from a very small fall makes a good supply because the ram is always going.

It is not necessary that the water which is pumped should be the same as the power water. Pure water can be delivered by the use of impure water without danger of mixing by means of a compound ram.

The size of the ram to be used will depend upon the amount of water power and both the amount of water required and height to which it is raised. The water can be delivered into an elevation tank or a pneumatic tank as desired and the overflow can be utilized by a water motor for pumping cistern water, shelling corn, or in any of the other numerous ways of saving hand labor.

The length of the drive pipe depends upon the fall to the ram and the height to which water is delivered. The delivery pipe will be governed by the conditions usual to water pipes. After the pipes are laid it is well to leave them uncovered until they are given a test in order to discover any leaks. The attention required by a ram is very little. A visit of inspection twice a week may be necessary. The mechanism is simple and, as the wearing is only in the two valves, the expense of maintenance is small. A small ram can be installed for $50 or less (pipe not included), and will be found a useful means of furnishing a water supply in many cases.

Windmills.

A good and simple way of securing a supply of water is by the use of a windmill. When the machine is properly constructed it will pump large quantities of water, and, like the ram, without cost, as the wind is free and cost of repairs is very small. The tower should lift the wheel 10 or 15 ft. higher than the tallest obstruction. The galvanized steel tower has almost entirely taken the place of the wooden tower, and is proving very durable. A combination tower which carries both a windmill and a storage tank is furnished by some manufacturing companies under the name of "suburban outfit." This outfit gives ample pressure for ordinary requirements, and can be made frost proof by inclosing the exposed pipes in two or more wooden casings with air spaces between, the outer casing being of matched boards and painted. A combination pumping and power mill is also manufactured, at a small additional cost, which will pump the water, grind the feed, shell the corn, saw the wood, and do the washing and churning with no expense for fuel; but the wind must blow.

If the windmill supplies a tank in the attic the supply is regulated by a tank float which shuts off the supply pipe when the water reaches a certain height and admits water again when the water level of the tank is lowered. An expansion joint should be used on the supply pipe to prevent the overstraining of the joints due to change of temperature. The same pipe that delivers water to the tank may be used to supply the house fixtures. If the windmill supplies a pneumatic tank an automatic pump should be used which will throw the wheel out of gear when a certain pressure is reached, and, when water is drawn, the reduction of the pressure will throw it in gear again.

The cost of installing a windmill will depend upon the depth and character of the well and its distance from the house and barns, upon the height of the tower, upon the elevation or pressure of the storage tank, and upon the amount of water required each day. These items vary so much with the individual cases that it is unsatisfactory to attempt to give even general figures. Any manufacturer of windmills will furnish an estimate upon application.

Gas or Hot-Air Engines.

Small gas or hot-air engines are now manufactured for the express purpose of pumping water from cisterns, springs, or wells to elevated or pneumatic tanks to furnish supplies for houses and barns. One advantage of the engine over the hydraulic ram or the windmill is that the water can be pumped when it is wanted, and the size of the storage tank can be more accurately determined. An engine can be selected which will burn any kind of fuel—natural gas, gasoline, kerosene, coal or wood. Such engines do not require an expert to run them, and, like the power windmill, can be used for driving other light machinery when not needed for pumping water.

The arrangement of the pipes to carry the water is governed by the same conditions as when other power is used. No more elbows or sharp bends should be used than are absolutely necessary, as they cut down the capacity of the engine; and when the water is to be pumped through a great length of horizontal pipe it is well to increase the size of the pipe.

The cost of a two or three horsepower engine will be from $60 to $130. The cost of the fuel is very small, as a half hour's pumping a day will furnish the average supply of water.

THE HOUSE.

Location.

In selecting a location for a house there are certain points that should be held in mind. A slight elevation, having proper surface drainage, with protecting hills or woods on the north, is greatly preferable to a narrow valley, a low meadow, or the north side of a hill. The house should face so as to get sunlight into all the rooms, if possible, for "where sunlight does not enter the doctor must." This may be accomplished by facing the house southeast, for example, instead of directly east or south.

FOUNDATION AND CELLAR.

After the selection of the site some study should be given to the character of the subsoil, the principal factors to be considered in this connection being the water and the air. There is a certain amount of moisture in the upper layer of the soil which is the cause of damp and unhealthy foundations. This dampness is derived mostly from the surface water, and is directly proportional to the absorptive power of the soil and can be diminished by tiling and trenching. The ground air is rendered impure by the gases arising from the decomposition and putrefaction that are constantly going on in the soil, especially in that which is contaminated by household wastes.

In the construction of the cellar the first thing is to provide such drainage as will draw off the water at least one foot lower than the surface of the cellar floor and prevent the ground air from passing through the walls and floors. In building the cellar walls every joint should be entirely filled with mortar. A good coat of asphalt over the outside of the wall turned in at the grade line with a course of slate or bluestone above ground level will prevent all soaking up of moisture. If a draintile is laid just outside the footing course and the space on the outside of the wall is filled with sand and gravel all the

way up to grade, the surface water will be carried away through the drain.

The floor of the cellar is best made by a layer of brick or of cinder concrete, covered by a layer of asphalt and finished by a 4-inch layer of stone concrete. A layer of well-beaten clay makes a good cellar floor, but it can not be so easily kept clean. The height of the cellar walls above the ground is important. They should extend a sufficient distance above the ground to admit of windows in the cellar at least 2 feet high. This will insure plenty of light and thorough ventilation. There should be cellar windows on all sides of the house.

PLUMBING.

Important Points to Be Kept in Mind.

There is a great difference of opinion among those who have made special study of sanitary plumbing concerning many of the details of construction and design, but the vital things to be kept in mind when laying out the system are to use the best material, isolate all plumbing, and concentrate as much as possible. By "best" material" is not meant the most expensive, but the most durable. Secure simplicity in all needed fixtures. Avoid complications in waste pipes. Select sinks without grease traps, bath tubs without inaccessible overflows, wash basins free as possible from fouling places, and water-closets without valves, connecting rods, or machinery.

The drainage system must be so constructed as to carry away completely, automatically, and immediately everything that may be delivered into it. It should be constantly and generally vented, frequently and thoroughly flushed and have each of its openings into the house securely guarded from the entrance of air from the interior of the drain or pipe into the room. All drains, soil pipe and waste pipe should be absolutely tight against the leakage of water or air.

The main line of the house drainage system begins at the sewer, flush tank, or septic tank, as the case may be, passes through the house by such a course as may be indicated by a judicious compromise between directness and convenience, past the location of the highest fixture that is to discharge into it, and then out through the roof for free ventilation. If possible, have the fixtures which are located on different floors in a direct line one above the other to avoid any considerable horizontal run. If bathrooms or water-closets are required in different parts of the house let each have its own vertical line of soil pipe. All plumbing fixtures on bedroom floors should be confined to bathrooms, and under no circumstances should there be a wash basin or any other opening into any channel which is connected with the drainage system in a sleeping room or in a closet opening into a sleeping room. Each bathroom should have exterior location and at least one window for light and ventilation, but pipes should not be placed against outer walls unless adequately protected against frost. Never have plumbing out of sight; let each pipe be in full view, and each closet, bath, or basin be unhidden by any sort of inclosing woodwork. There is quite as much danger from the dirt which is apt to gather around concealed pipes and beneath inclosed sinks, bowls, or closets as there is from the admission of sewer gas. The simplest way to prevent the accumulation of dirt is to make it easier to be clean than to be dirty. Therefore keep the plumbing fixtures where there is plenty of light.

Improvements for the Kitchen.

The kitchen is a most important part of the house. On it depends the physical life, and to a large degree the spiritual life, of the family. Realizing its importance, sufficient time and thought should be given to it to secure the best results possible from the material at hand.

Ventilation; Walls and Floors.

Perfect ventilation is the first requirement of a kitchen, light comes next, and in turn the possibilities of perfect cleanliness. The walls should be painted so that they may be wiped off with a damp cloth, making cleanliness possible without great demand on strength, and without the disarrangement caused by white-washing and kalsomining. In these days of enameled paint the walls and shelves of all kitchen closets should be painted. Painted shelves can be wiped off with a damp cloth every day if need be. Paper in kitchen closets is always a bid for dust and vermin.

Hard wood makes the best kitchen floors. Linoleum or oilcloth are labor-saving, and, if cut to exactly fit the floor and all joints cemented, are perfectly sanitary. Intelligence does not countenance a carpet on the kitchen floor.

The Range.

Whatever fuel is used, let the range be one of the best in the market. This is true economy. Near the range and under the same ventilating hood should stand the oil or gasoline stove. There is an infinite variety of these stoves, all economical, cleanly, and safe if managed with care.

A hood suspended over the kitchen range and connected to a flue in the chimney will gather all the steam and odors and carry them away.

Laundry Arrangements.

When the kitchen is also used as the family laundry, stationary tubs of enameled iron or of soapstone should adjoin the sink. They should be covered to form a table when not in use, but as confined air near plumbing becomes dangerous the covers should close upon rubber knobs or wooden blocks, so as to leave an air space for ventilation. Nickle-plated union strips and hardwood-wringer holders should be added between the tubs and at the right hand end, so that a wringer may be used. One of the needs of the ordinary farmhouse is a suitable place for the workmen to wash as they come from the fields. When a separate room is fitted up as a laundry, provision should be made here for the men by adding a large sink and bench.

The Kitchen Sink.

The kitchen sink should be of cast iron, plain, galvanized or enameled, broad, and of a generous size, preferably with a high back to protect the wall from the water which is certain to splash when drawn rapidly from the pipes. The faucets should be set well up and back to avoid the breakage of dishes by striking them against the faucets. The waste pipe should be covered with a fairly fine brass strainer, which should be held securely in place by screws. At one end should be placed a long draining shelf, the shelf should be well grooved and inclined slightly toward the sink. Both tubs and sink should be well trapt, but as grease traps when neglected are filthy things, and as proper care of the pipes renders them unnecessary in an ordinary kitchen, they should be avoided. Kitchen and pantry sink drains should be treated frequently to a wash of hot water and ammonia or soda to keep them clear from deposits of grease. Kitchen sinks are used for the discharge of liquids which in their original condition are not offensive, but which after a little retention begin to putrefy, and it is very important to secure the complete removal of all such matter well beyond the limits of the house before putrefaction begins.

Refrigerator drains should never connect directly with the drainage system.

Hot-Water Apparatus.

A hot-water supply may be furnished by a special heating apparatus in the cellar, a furnace connection, or, as is usual in small houses, by a boiler and water-front attachment for the range. In Fig. 2 is shown the boiler, water front, and pipes for a successful water heating and circulating system. The cold water should always enter the boiler at some distance below the point of entrance of the hot water from the water front of the range; the greater this distance the better will be the circulation, and the less time it will take to heat a certain amount of water. The kitchen boiler is simply a storage tank to keep a supply of hot water on hand so that it can be

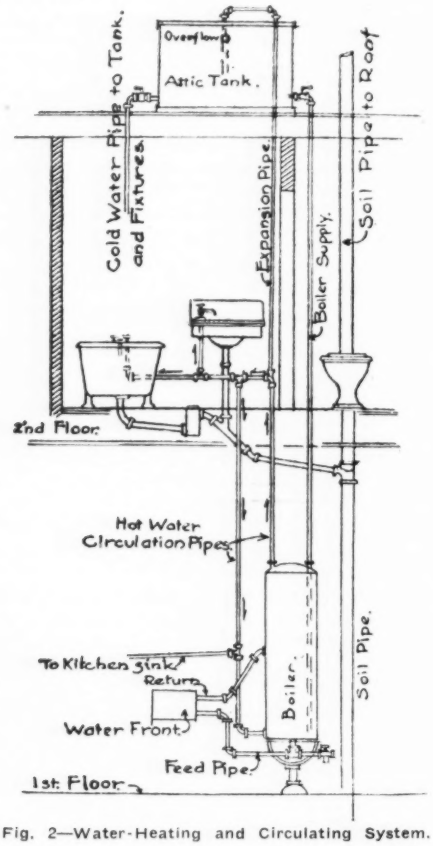


Fig. 2—Water-Heating and Circulating System.

drawn when required. The chemical properties of the water often determine whether a copper or galvanized-iron boiler may be used. Certain waters will rust out a galvanized-iron boiler in a few years, while a copper boiler, used in its place, would last a lifetime. The hot water stores itself in the upper part of the boiler and is forced out by the cold water entering at the bottom. The upper pipe, or hot-water pipe, from the water front to the boiler must not be allowed to sag, but must have as much elevation as possible, and also large-sized elbows should be used, in order that the flow of water will have the least possible friction to contend with. The more elevation we get from the water front to the boiler the better the water will circulate, but the slightest rise in the pipe will make a satisfactory job. It should be a continuous rise from the range to the boiler. To prevent the pounding of steam in the boiler an expansion pipe should be provided to allow the escape of steam and air bubbles if the water comes from a tank in the attic. This expansion pipe should open over the overflow from the attic tank. When pressure tanks are used the expansion pipe must be omitted. The sediment which is constantly accumulating in the boiler should be blown off through the stopcock for that purpose, found under every boiler.

The range and boiler are set as close together as they can be for the purpose of getting the best results in regard to the heating of the water. The best kind of pipe for connecting them is either copper or brass, ¾ or 1 in. in diameter, with fittings of the same material having threaded joints. Lead pipe is too soft for the purpose and will not stand the high temperatures which the water in these connections often reaches. If it is desired to draw hot water from the different faucets throughout the house at the moment the faucet is opened, instead of having to wait until all the water in the pipe has been drawn out, it is necessary to have a circulation of the hot water at all times from the boiler to the different fixtures. The hot-water pipe is started from the boiler and carried up, as shown in Fig. 2, to the highest fixture and then connected. The return pipe is carried down, as shown by the direction of the arrows, and this pipe connects with each of the lower fixtures, finally ending at the bottom connection of the boiler. Be sure to have some upward slope at all points to the pipe which leads from the boiler to the highest fixture, but it is not necessary that the return have a continuous fall.

INSTALLATION OF THE BATHROOM.

Walls and Floors.

The bathroom should be a light, well-ventilated room with every facility for cleanliness. Floors and wainscoting of tile or composite material are most desirable, but painted walls are much less expensive and give excellent results. Tile is undoubtedly the most satisfactory material which can be used for the covering of the floors and walls where it can be afforded. Tile floor with covered base and walls finished with cement or hard plaster, painted with enamel paint, are much cheaper. When a tile floor can not be had, linoleum is an excellent substitute, as it is practically impervious to water. It should be laid before the fixtures are set, in order that there may be no joints. Cement mixed with small chips of marble well rubbed down after setting makes an excellent floor, one that washes as clean as a porcelain plate and has no cracks to harbor dirt; the cost is only about twice that of a double wood floor, or 50 cents per sq. ft., including the necessary cement bed on which it is laid. When it is desired to lay a cement, composition, or tile floor upon wooden floor joists, proceed as follows: Nail a 2x4 to the side of each of the floor joists flush with the bottom. Upon the top of these stretch wire lath, after the joists have first been covered with tarred paper to prevent their absorbing moisture; and upon this lay cinder concrete, made of 1 part portland cement, 3 parts loose sand, 6 to 8 parts crushed and screened furnace clinkers, filling in to a level at least 2 ins. above the top of the joists. Upon this is placed the floor finishing. Cinder concrete is used because it is so much lighter than that made of stone. When a tile or cement wainscot is too expensive the walls should be painted. Wall paper is not desirable in a bathroom, nor is wood paneling.

(To be continued.)

The Gurney Heater Mfg. Co., Boston and New York, is keeping the heater trade up to blowing-off point by sending to its customers a neat and attractive desk calendar. Guess you can get one if you hurry.

REPORT OF THE COMMITTEE OF FAN-BLAST HEATING.*

This final report of your Committee concludes those presented at the January meetings in 1908 and 1909.

Replies to the questions in the 1908 report have been received from one other manufacturer as follows:

Question. 1. Please send elevations, sections, etc., showing clearly the construction of your standard heater sections.

Answer. 1. Illustrations were sent.

Question. 2. What size and kind of pipe do you use?

Answer. 2. One-inch steel.

Question. 3. What size and kind of fittings do you use?

Answer. 3. One-inch cast iron.

Question. 4. What distance do you space your pipes between centres across the face of the heater, also the direction the air flows?

Low pressure 5 pounds.

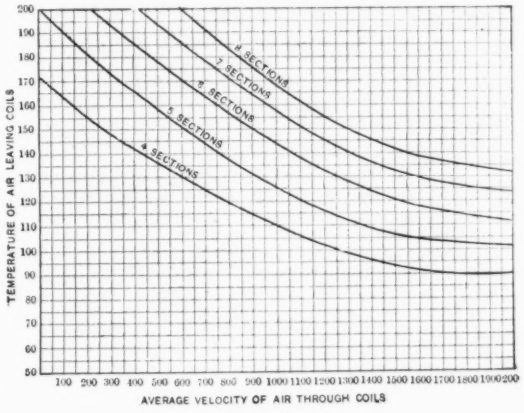


Chart A.

Answer. 4. 2¾ inches.

Question. 5. How are sections connected together; by manifolds, heaters or flanges, and where or when do you use the several methods?

Answer. 5. With cast-iron manifolds, wrought nipples and flanges. We use this manifold on factory work only, for Public Building work, the connections are always made by steamheating contractor.

Question. 6. What depth to you advocate making the coils in rows of pipe, for (1) outside air, (2) return air for c, d, e, f?

(a) Live Steam, heating public buildings?
(b) Exhaust Steam, heating public buildings?
(c) Live Steam, heating factories?
(d) Exhaust Steam, heating factories?
(e) Live Steam for dry kilns?
(f) Exhaust Steam for dry kilns?

Answer. 6. (a) We believe it very uneconomical to use live steam for heating purposes for Public Buildings, or to ever use anything but fresh air. Whenever our advice is asked, and where there is not enough exhaust steam available, we should use a pressure-reducing valve.

(b) 20 rows.

(c) 20 to 24 rows.

(d) Never less than 24 rows. If fresh air is used, sometimes 28 rows.

(e) We do not believe that blowers should ever be used for drying the ordinary grades of lumber. For certain special classes of lumber such as soft maple broom handles, gum barrel staves either for slack or tight barrels or cottonwood staves, the blower system is the only system to be used. The heater should be at least 24 rows deep for live steam or 32 rows deep for exhaust steam.

Question. 7. What is the ratio of free area between the pipes to the "over-all area" of a section?

Answer. 7. Roughly, about 50 per cent.

Question. 8. What is the maximum allowable velocity of air through a heater section as determined by you:

(a) For public buildings?
(b) For factory buildings?
(c) For dry kilns?

Answer. 8. (a) 1,000 feet. (b) 1,500 feet. (c) 1,500 feet.

Question. 9. What temperature do you consider the air should be heated to, to give best results with a tempering coil?

Answer. 9. Fifty degrees.

Question. 10. How many rows of pipe do you allow for:

(a) Tempering coil?
(b) Heater coil?

Answer. 10. (a) From 4 to 8, depending upon space conditions. (b) From 8 to 12.

Question. 11. Do you advocate blowing through or "drawing" through a heater? Where and why?

Answer. 11. For most Public Building work, we advocate blowing through, because it is usually easier to arrange for by passing the air for tempering purposes. On Public Building work, we use a "draw-through" heater only when conditions make it necessary. On factory work, we use a "draw-through" heater almost entirely because of space conditions.

Live steam 80 pounds.

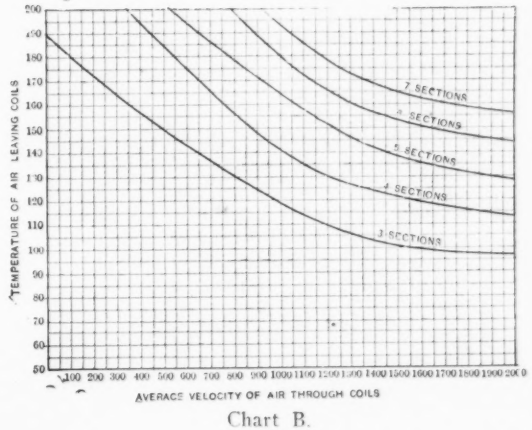


Chart B.

Question. 12. How do you determine the maximum temperature obtainable with varying depths of heaters, velocities and steam pressures?

Answer. 12. From temperature and velocity charts A and B, showing final temperature of air leaving heater made up of sections having 4 rows of 1-inch pipe each, spaced 2¾ inches on centres, temperatures of entering air o degrees Fahr.

Question. 13. How do you determine the heat units given off per square foot of heating surface per hour with varying initial temperatures and velocities of air,

*Read at the Indianapolis meeting of the American Society of Heating and Ventilating Engineers.

and steam pressures; also the condensation under same conditions?

Answer. 13. The Relative Condensation in Heater Sections of 4 rows of 1-inch pipe each, spaced 2¾ inches on centres, entering air o degrees Fahr., average air velocity between pipes 800 feet per minute is:

1 4-row section.....1.48	5 4-row sections.....1.08
2 4-row sections.....1.37	6 4-row sections.....1.00
3 4-row sections.....1.25	7 4-row sections.....0.95
4 4-row sections.....1.175	8 4-row sections.....0.85

Question. 14. What has been your experience with cast-iron pipe or other indirect radiation besides pipe coils?

(a) Has it been as effective as a heating medium?

(b) What is the comparative efficiency?

Answer. 14. As we are manufacturers of pipe coils and not of cast-iron radiators, our answer to this question would necessarily be biased and, hence, not given.

Question. 15. What type of radiation do you recommend for hot-water heating?

Answer. 15. A mitre section [having vertical supply header and horizontal return header]. We recommend the same type of section for either gravity circulation, or for forced circulation by pump, but we would not advocate a gravity hot-water system for blower work.

Question. 16. How do you compute the size of steam mains and returns for heaters supplied with steam at varying pressures? Also for hot-water circulation?

Answer. 16. Have no good rules for this.

Question. 17. Do you regularly make provision for the removal of air from the radiation? If so, where and under what conditions of operation?

Answer. 17. With our standard heater we get very good results without any special provision for removing the air from coil.

Question. 18. Do you consider air valves either a necessary adjunct or a means of increasing the efficiency of the type of radiation you make?

Answer. 18. We do not.

Question. 19. Do you make any addition to or deduction from the amount of radiation, as commonly determined by the rules or formulæ you employ, if any one of the several "Vacuum Systems" is attached to the heater?

Answer. 19. We make neither addition nor deduction from the amount of radiation as commonly determined by our method of figuring if any one of the several "Vacuum Systems" is attached to our heaters.

While illustrations of various types of heaters might perhaps have been included to advantage in this report, it has not seemed necessary to do so, since these may be had for the asking from the several manufacturers.

Although as many replies were not received as your Committee had hoped for, it is believed that the data secured will enable the Committee on Standards (to which these data are to be referred) to arrive at some conclusions which will be of value to the Society.

R. C. Carpenter, J. H. Kinealy,
Wm. G. Snow, Chairman, F. R. Still,
Committee on Fan-blast Heating.

The Eureka Valve Co., 19 High St., Boston, Mass., announces that it has secured the services of E. W. Barnes, for several years past with "Domestic Engineering," as its general representative.

Mr. Barnes, who is well known in the plumbing and heating-trade circles, will visit the wholesale trade in the interests of the line of O. K. ball cocks manufactured by that company, and the nipple chucks manufactured by the National Nipple Chuck Co., a subsidiary concern.

RECORD-BREAKING PRODUCTION OF COPPER IN 1909.

Statistics and estimates received by the United States Geological Survey from all parts known to produce blister copper from domestic ores and from all lake mines indicate that the copper output from mines in the United States in 1909 surpassed all previous records.

The figures, which have been collected by B. S. Butler, of the Survey, represent the actual production of each company for eleven months and include an estimate of its December output. The November figures for a few companies were not available, and these companies furnished estimates for the last two months of the year. According to the statistics and estimates received, the output of blister and lake copper was 1,117,800,000 pounds, as against 942,570,721 pounds in 1908, an increase of over 18 per cent. This not only exceeds the increase of any previous year, but it is considerably greater than the total yearly increase since 1904.

It is impossible now to give figures that represent accurately the distribution of the output among the States of origin, but a few general statements may be positively made concerning the leading copper-producing States. Montana shows a large increase, again taking first rank, a place lost to Arizona in 1907. The production in Montana will nearly equal or will possibly exceed the State's previous record output, 314,750,000 pounds, made in 1905. Arizona holds second place, with a slight increase over the 289,523,000 pounds produced in 1908. Michigan also exceeded the 1908 production, 222,289,000 pounds. Large gains were made by Utah and Nevada, and California also increased its output considerably.

Statistics showing the output of refined copper by plants in the United States are now collected by the Geological Survey. Figures published by the Copper Producers' Association indicate that the production of marketable copper from all sources, domestic and foreign, for the first eleven months of 1909 will exceed 1,400,000,000 as against 1,161,176,085 pounds in 1908. Statistics showing domestic deliveries for the first eleven motnhs of the year, as given by the Copper Producers' Association, indicate a consumption of copper in the United States considerably greater than the previous record consumption—682,000,000 pounds, in 1906.

Estimates based on figures for the first eleven months, published by the Bureau of statistics and also by the Copper Producers' Association, indicate that the exports of copper will surpass by several million pounds the exports for 1908—661,876,127 pounds.

According to the Bureau of Statistics, imports of pigs, bars, ingots, plates, and old copper for the first eleven months amounted to 213,100,281 pounds, and the copper content of ore matte and regulus imported amounted to 74,708,482 pounds. If the imports for December were equal to the average monthly import for the first eleven months the amount of copper entering the United States for the year was about 311,800,000 pounds, as against 218,705,487 pounds in 1908.

Stocks of refined copper in the United States show a considerable increase over those of January 1, 1909, but the accumulation occurred for the most part during the first half of the year. European stocks, however, have increased rather uniformly throughout the year and at the close were probably nearly double those of January 1, 1909. The price of copper has remained close to 13 cents throughcut the year, the average monthly New York quotation for Electrolytic copper being a little under 13 cents.

Mine development has been active in most of the important camps, but especially so in the deposits of disseminated ore in Arizona and Nevada. The mines and the smelters of the country are now in a position to make the output of 1910 larger than that of 1909. So many factors, however, enter into the determination of the output that any forecast of production of the coming year made at this time would be without value.

IOWA PLUMBERS TO MEET AT CEDAR RAPIDS.

The annual convention of the Iowa Master Plumbers' Association will be held at Cedar Rapids on Tuesday, Wednesday and Thursday, Jan. 18, 19 and 20, 1910, according to the official call which has just been issued by President J. F. Garvey and Secretary W. A. Bruce. Headquarters will be established at the Montrose Hotel.

LOCAL NEWS

THE PACIFIC COAST.

San Francisco, Cal.—The Lennig-Rapple Engineering Co., 1402 Call Bldg., has been awarded the contract for the installation of heating and power systems in the new Hall of Justice. The consideration is $28,692.

San Mateo, Cal.—E. C. Cottier, Railroad Ave., has been awarded the contract for the installation of heating and ventilating systems in the San Mateo grammar school. The consideration is $3,329.

Long Beach, Cal.—One of the most complete and elaborate systems of plumbing ever installed in this part of the country is being planned for the proposed six-story, reinforced, concrete apartment house to be erected at Long Beach, Cal., by the Parsell Construction Co. The plans are now being perfected by L. S. Munson, architectural engineer, 704 Central building, Los Angeles, Cal. There will be separate systems for hot and cold, soft water and sea water, which means four cocks for every bath tub and lavatory. The problem of securing durable plumbing for the sea water system is one to which Mr. Munson has given much study. When the sea water is heated, chlorine gas is liberated. This corrodes the ordinary metals, such as iron and brass. The latter is the more durable, but not wholly satisfactory. Mr. Munson has conducted a series of experiments with aluminum alloy, and finds that there is no appreciable corrosion when it is subjected to the influence of either heated sea water or a strong brine. The cost of brass plumbing is about double the cost of the ordinary iron pipes, and aluminum alloy costs about fifteen per cent more than brass. It has been decided that, notwithstanding the greater cost, aluminum will be more economical. All the pipes and fittings for the water system in the big apartment house will, therefore, be made of that metal. Copper boilers will probably be used. A cooling system will also be installed to supplant refrigerators and avoid the carrying of ice through the building. Cold brine will be forced through coils in the cooling closets in all the apartments. None of the plumbing will be encased in concrete. All pipes, including those for steam, will be carried up through vent shafts where they will be exposed. Access to the plumbing will be obtained from doors to these shafts on every floor, so that the plumbing may be easily repaired or replaced.

MIDDLE STATES.

Springfield, Ill.—The Illinois Plumbing & Heating Co., Springfield, has been awarded the contract for the installation of up-to-date plumbing and heating systems in the new Edwards school building, which is being erected here. The heating contract amounts to $7,778 and the plumbing to $2,648.

Dayton, O.—The M. J. Gibbons Co. has been awarded the contract for the installation of a heating system in the County Infirmary. The consideration is $4,744

Charleston, Ill.—The White Plumbing & Heating Co., Charleston, has been awarded the contract for the installation of a modern plumbing system in A. D. Greathouse's new residence at Dudley, Ill.

Joliet, Ill.—Lawrence Henschen has admitted his brother, Arthur Henschen, into partnership in his plumbing business on Bluff street, Joliet.

Chicago, Ill.—The Enterprise Plumbing Supply Co. has been incorporated with a capital of $35,000 to conduct a plumbing and steamfitting business. The incorporators are John L. Fruin, David Jacobson and R. T. Brady.

Jackson, Mich.—James J. Keeley Plumbing Co., 511-513 North Jackson St., Jackson, has secured the contract for the installation of plumbing and heating systems in the Arlington hotel and store building.

Lee F. O'Donnell, the youngest master plumber in St. Louis, Mo., met his death last week while trying to cross the river on too thin ice. His funeral was attended by a large number of his friends in the trade. His up-to-date plumbing establishment was located at 4478 Easton avenue, St. Louis.

NOTES FROM THE WEST.

Libertyville, Mo.—The partnership of Alvin Dudfield and T. G. Klepper, jr., known as the Liberty Plumbing & Heating Co., was dissolved on Jan. 1, 1910, and the business is now conducted by Mr. Dudfield under the same name as heretofore.

Kansas City, Mo.—The Arthur McKinley Plumbing Co., Kansas City, has been incorporated with a capital of $10,000 to conduct a general plumbing business. The incorporators are Samuel S. McKinley, M. E. McKinley and Arthur McKinley.

St. Louis, Mo.—The Edward C. C. Reisel Plumbing Co., St. Louis, has been incorporated with a capital of $10,000 to conduct a plumbing business. The incorporators are Edw. C. C. Reisel, Charlotte Reisel and William S. Goodrich.

Iowa City, Iowa.—Wm. J. White has purchased the business of the U. S. Plumbing & Heating Co., 123 E. College St., in this city. He would like to receive catalogues from manufacturers and jobbers of plumbing and heating goods.

CONDUCTING A PLUMBING BUSINESS IN PLEASANT SURROUNDINGS.

J. H. Emmert, a popular master plumber in Portland, Oregon, evidently believes in combining business with comfort, if appearances are a criterion. The accompanying illustration shows his place of business to the left,

J. H. Emmert's Attractive Plumbing Establishment and Residence in Portland, Oregon.

as indicated by the sign which is visible at some distance, and his residence to the right, the entire arrangement making such a pleasant and attractive place that it is not to be wondered at that Mr. Emmert and his assistants are able to turn out good work there.

M. Edward Meehan, for several years in the plumbing and steamfitting business in Brockton, Mass., passed away on the morning of December 18th at his home in that city. He was 37 years of age and a native of Ludlow, Vermont. He was formerly in the firm of Powers & Meehan but recently had been in business for himself with an establishment on High street.

A. M. Poulsen, Berkeley, Cal., has recently secured the contracts for the plumbing for the Fitzgerald Apartments in Oakland, for the sum of $3,000; for a residence for Mr. Brayton in Piedmont for the sum of $1,668; also the plumbing, steam-heating and galvanized iron work for an apartment house for J. M. Pierce, in Berkeley, for the sum of $7,000.

PITTSBURGH AND VICINITY.

Greensburg, Pa.—The contracts for the heating systems for the two new residences that are being built here for John Burrell have been awarded to Charles Hall, of Grapeville, Pa.

Latrobe, Pa.—L. H. Harr, of this city, has received the contract for the heating system for James McDermott's handsome new residence.

South Greensburg, Pa.—The contract for the heating system for the new store and apartment building that is being built here for Homer Klingensmith has been awarded to D. W. Bortz, of Greensburg, Pa.

Cresson, Pa.—The contracts for the plumbing and steam-heating systems for the fine new banking and business building that is being built here for the First National Bank have been awarded to Mulsh Bros., Hollidaysburg, Pa. Both systems will be elaborate and the plumbing will require many high-class fixtures.

Pittsburgh, Pa.—Deer & Ober, 1001 Chestnut St., North Side, have received the contract for the elaborate plumbing system that is specified for the large three-story addition that is being built to the Methodist Episcopal Deaconess' Home on Jumonville street. The contract calls for many fixtures.

SOUTHERN NOTES.

Fairmont, W. Va.—The contract for the installation of a plumbing system in the handsome new office building for the Monongah Glass Company has been awarded to the Mountain City Plumbing & Electric Company, of this city.

Morgantown, W. Va.—The contract for both the plumbing and steam heating systems for the addition that is being built to Woodburn Hall, University of West Virginia, has been awarded to the Standard Plumbing & Supply Company, Morgantown. The combined contracts amount to $3,500.

Summerville, W. Va.—The contracts for the plumbing and steam heating systems in the new Nicholas county jail here, and also the same contracts for the new residence for the jail warden, have all been awarded to the West Virginia Plumbing & Heating Co., Charleston, W. Va.

Grafton, W. Va.—A. E. Jackson has moved his plumbing and heating establishment from the old location at 11 West Main St. to larger quarters at 18 West Main St. In his new location, he will carry a much larger stock of plumbing and heating goods, and will fit up and equip a modern show room.

Grafton, W. Va.—G. C. DeWordy, for some years located at 47-51 East Main St., has started some extensive improvements at his place of business, which when completed, will give him one of the handsomest plumbing and heating establishments in this state. He is rearranging his entire establisment, and will double the size of his show room, as well as arrange to carry a much larger stock of fixtures. He reports that he is quite busy at the present time with a number of good plumbing and heating contracts which will keep him busy for two months.

Paducah, Ky.—Ed. D. Hannan, Paducah, has secured the contract for the installation of a steam-heating system in the Caldwell hotel at Paris, Tenn. The contract is a large one. Mr. Hannan is meeting with such success in his plumbing and heating business that he has decided to erect a new and large building with adequate facilities for its needs.

Gowanda, N. Y.—C. S. Gayton and Daniel Gross have formed a partnership and opened a new and up-to-date plumbing establishment under the name of Gayton & Gross.

Brooklyn, N. Y.—M. J. Kennedy Plumbing Co., Brooklyn, has been incorporated with a capital of $5,000 to conduct a plumbing business. The incorporators are Matthew J. Kennedy, 176 State street; Francis J. Conovan, 97 Driggs avenue; Michael Fogarty, 119 Russell street, all of Brooklyn.

NEW ENGLAND STATES.

Sanford, Maine.—James Mullen of Springvale has the plumbing and heating contract on the new house being erected here by John Long.

Nashua, N. H.—William Allard has the contract to do the plumbing for the new church and school being built on Allds street.

Burlington, Vt.—The G. S. Blodgett Co. was the lowest bidder for the heating and plumbing of the new Theatorium building now being erected by Brownell & Hawley, on Main St., and has been awarded the contract.

Rockport, Mass.—Thurston & Hale have been awarded the contract for plumbing the summer residence of W. W. Blunt, cashier of the Boston Journal, on the Headlands. They are also doing the plumbing at the Babbitt residence at Land's End.

Maynard, Mass.—The town is considering an appropriation for the heating and ventilating of the school building. This appropriation is in addition to the amount already voted for the work.

South Framingham, Mass.—The hardware and plumbing business of Henry L. Sawyer has been incorporated. The directors of the new company are Emma L. Sawyer, South Framingham, president and treasurer; T. J. Kenny and Etta M. Sawyer.

Holyoke, Mass.—P. J. Donnelly has been awarded the contract for the heating of the new high school building being erected in Ludlow.

Lowell, Mass.—Charles Hanchett & Co. has the contract to install a steam boiler in the residence of John W. Fox at 34 Saratoga St. The same company is overhauling and altering the plumbing at the residence of Fred C. Church on Belmont avenue.

Lowell, Mass.—Farrell & Conaton are doing the plumbing and installing a steam heating plant in the house of T. B. Sullivan, 83 Durant St. They also have the contract for the plumbing in the residences of S. N. Harris, on Marsh St., and James Palm, on Plain St.

Manchester, Mass.—E. S. Bradley is erecting a new plumbing shop on his property at the rear of the dwelling house adjoining his present establishment on Central street. He will occupy the new building just as soon as it is completed, his business demanding more commodious quarters immediately.

Northampton, Mass.—W. H. Riley & Co. has been awarded the contract for doing the extensive plumbing work in the new Smith College Assembly hall. The heating contract was awarded to a Boston firm whose name has not been announced.

Clinton, Mass.—George McLeod has the contract to do the plumbing in the house owned by Thomas O'Brien on Clark St. which was recently damaged by fire. A new and modern plumbing system will be installed.

Marlboro, Mass.—G. R. Hall & Co. has the contract for installing the plumbing in the new house now being erected on Bicknell St. for F. R. S. Mildon, formerly mayor of this city.

Lenox, Mass.—William Mahanna has awarded the contract for installing a steamheating plant in his new business block at Church and Depot streets to John Kirkwood.

South Norwalk, Conn.—Jones & Hotchkiss have been awarded the contract for the plumbing and heating in the new house of Jenette C. Giles at Canfield Island.

Kensington, Conn.—Herbert Damon has secured the contract for plumbing and heating the new house of F. P. Day on Farmington road which is now rapidly nearing completion.

Plainville, Conn.—Connelly & Cavanugh, Hartford, plumbers and steam-fitters, are contemplating opening a branch establishment in this town. Representatives of the firm were recently here seeking a location and it is anticipated that the concern will locate here shortly.

North Providence, R. I.—The school board has awarded the contract for installing a steam-heating plant in the Fruit Hill school to Robert W. Hay.

Newport, R. I.—Thomas B. Connolly has received the contract for plumbing the new home of Commodore Arthur Curtiss James, on Beacon Hill Rd., and the other

Mid-Winter Jobs

During "real cold spells" the jobs swarm into the shop like bees into the hive. Folks wake up to the fact that Hot Water or Steam Heat is mighty nice to have in the house---and the quicker the better.

IDEAL Sectional Steam Boiler with 28-inch grate-

Of course you can fix them up in "two shakes" if you have the goods and that is why we want to again remind you that we keep an ample stock of AMERICAN Radiators and IDEAL Boilers in warehouses near at hand to shorten the time between the order, the finished job, and the pay in your pocket.

AMERICAN & IDEAL
RADIATORS & BOILERS

A Heating Outfit is More Efficient with NORWALL and SYLPHON SPECIALTIES

AMERICAN RADIATOR COMPANY

General Offices, 282-286 Michigan Ave., Chicago.

New York	Cincinnati	Cleveland	Atlanta	Bradford, Ont.	Denver
Philadelphia	Boston	Milwaukee	Minneapolis	Seattle	St. Louis
Pittsburg	Buffalo	Indianapolis	Kansas City	Omaha	San Francisco
Washington					

buildings to be erected on the property. It is one of the largest plumbing contracts that has been given out here in several years.

Middletown, Conn.—The city is considering the adoption of an ordinance providing for the appointment of an inspector of plumbing.

Norwalk, Conn.—Frank I. Jones, of the Norwalk Heating & Plumbing Co., has secured a large heating contract in Brooklyn, and has a force of local men at work on the job.

Bridgeport, Conn.—Harry Fitzgerald, the State St. plumber and steamfitter, is sending out a neat desk blotter as a New Year's remembrance. It bears his likeness on the celluloid top.

Bridgeport, Conn.—Joseph Mullins & Co. has the contract for the plumbing and metal work in the store and tenement building on Barnum Ave., which William and James Garrity are erecting. The building will contain four apartments in addition to several stores.

Wallingford, Conn.—The firm of Gannon & Kavanagh is to be succeeded in the plumbing and heating business by Edward F. Cavanagh who has purchased the interests of his partner James T. Gannon.

Lowell, Mass.—Martin Kirkeby, who is erecting a two-apartment modern house on Stevens St., has awarded the contract for the installation of heating systems to P. F. Welch.

Willimantic, Conn.—Moriarty & Rafferty have the contract for the installation of the heating system and power plant in the new state normal schools here, from which two of the city schools will be heated. The contract aggregates $9,000. They also have the contract for the heating and plumbing in the new post office building which amounts to between $5,000 and $6,000.

Chicopee, Mass.—Charles J. O'Brien, plumbing inspector, is preparing his annual report. His figures will show that there have been more building operations in the city the last year than in any other year in the history of the city. During the past year 200 new tenements have been erected and all of them have been equipped with modern plumbing of the open style with bathtubs, basins and other extra fixtures. In 1908 300 fixtures were installed as against 1,200 in 1909.

Moosup, Conn.—Joseph Chartier has opened a plumbing establishment in the store adjoining the Hyde block. Mr. Chartier has fixed up a show room where he has an extensive display of bath-room fixtures.

Greenwich, Conn.—Opperman & Tennessey have opened a plumbing and steamfitting business in this town.

Augusta, Maine.—The Stewart Plumbing Co., Skowhegan, which has the contract for the plumbing of the new state house, is nearly ready to commence work. The supervision of the work will be in charge of Benjamin Stewart, a member of the firm.

Nashua, N. H.—C. B. Jackman & Son have the contract for installing the plumbing and blower system at the new plant of the Wonalancet company.

Belfast, Me.—Albion P. Goodhue, Jr., has the contract for plumbing the big bungalow which is being erected for Levi Harriman, of Cambridge, Mass., at Northport.

Skowhegan, Maine.—Contracts were signed a few days ago between George A. Fuller & Co., Boston, who has the entire contract for the enlargement of the state house at Augusta, and the firm of Reed, Stewart & Blunt of this place, whereby the latter firm was awarded the job or putting in the plumbing. The contract price for the work was $8,600.

York, Maine.—John F. Dowd, the plumber in the Lancaster, is preparing to commence on one of the largest plumbing contracts ever let in the town of York, that in the summer residence to be erected for A. M. Gross, the well-known Chicago lawyer. He is also installing a hot-air furnace for A. M. Bragdon.

Exeter, N. H.—Joseph H. Symonds has purchased the good will, plant and personal property of the Exeter Machine Works, manufacturers of blowers, steam and hot water heating specialties and ventilators. Mr. Symonds has assumed control and will convey the property to two associates and effect a reorganization of the company. It is expected that William Burlingame will continue a director and retain an active interest in the business.

Springfield, Mass.—Proposals for work in connection with the new group of municipal buildings soon to be erected in Springfield were received by the municipal buildings commission a few days ago. For heating and ventilating the entire group the lowest bid was that of James P. Dwyer, Boston, his figures being $39,300. The lowest separate bids were as follows: Auditorium alone, James P. Dwyer, $22,891; clock tower alone James P. Dwyer $335; municipal building, C. H. Sanborn of Boston, $15,351. The total of this combination is $38,780, as compared with the bid of Mr. Dwyer on the whole of $39,390. For plumbing the entire group the lowest bid was that of William H. Mitchell & Sons Co., Boston, their figures being $36,575. The lowest separate bids were as follows: Auditorium, William H. Mitchell & Sons Co., $14,950; clock tower, J. J. Cotter, Springfield, $500; municipal building, Pierce & Cox, Boston, $19,977. This combination totals $35,427 as compared with the bid of Mitchell & Sons Co. of $36,575. The commission has as yet awarded no contracts.

BLANK FOR REPORT

Awards of Heating or Plumbing Contracts

(Cut out, fill in and mail promptly)

DOMESTIC ENGINEERING
323-325 Dearborn St., Chicago

We have been awarded the

Plumbing Contract_____

Heating Contract_____

Kind of Building_____

Amount of Contract_____

Owner's Name_____

Architect's Name_____

Address_____

Our Own Name_____

Address_____

With the Makers

A NOVEL SAMPLE BOARD.

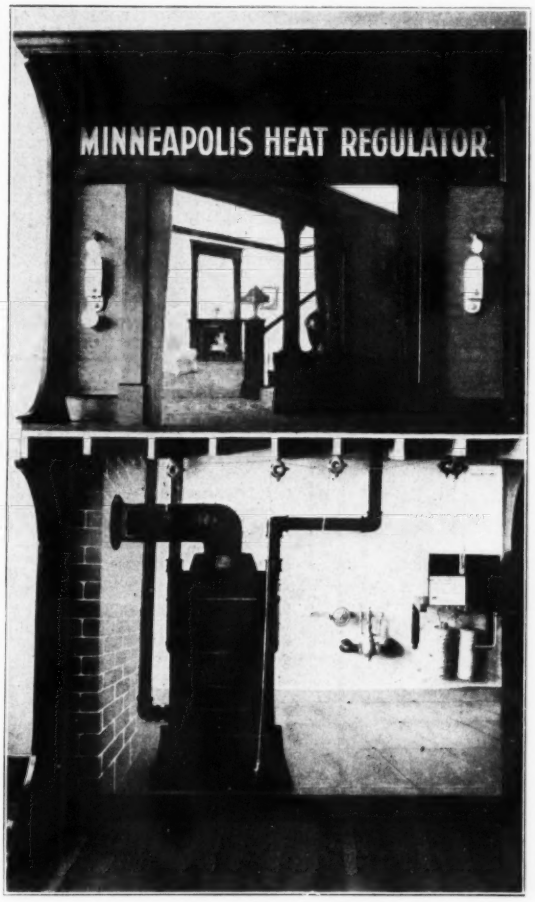
A very effective, handsome and novel sample board is used by the Electric Heat Regulator Co., in their general offices in the Palace building, Minneapolis, for exhibiting and demonstrating their Minneapolis heat regulators, as shown in the accompanying illustration. The case is made of mahogany; the upper half shows a section of the floor and represents the living room of a residence. The panels at the sides, upon which are mounted two thermostats—the one on the right without time attachment and the one on the left with time attachment, are decorated, with handsome burlap. The door casings and panels are in mahogany.

The archway opening between the rooms is covered with canvas upon which is painted in perspective the view of

the hall and another room with mantel, stairway, etc. The section of the floor is carpeted with velvet.

The lower half of the board shows the section of the basement in the dwelling, which is also covered with canvas, upon which is painted the chimney, the boiler, the smoke pipe and the connecting piping, etc.

Mounted upon the painted boiler and smoke pipe are regular cast-iron dampers to which the motor is connected



Electric Heat Regulator Co.'s Sample Board.

up exactly according to the regular usage, by means of chains and pulleys.

It will also be noticed that there is mounted a special gas valve or steam valve, showing its operation.

Above each of the thermostats mounted on the wall, above described, is a small electric-light fixture. When the motor operates the drafts are opened in the basement; at the same time by means of an ingenious switch, the electric light is lighted back of the front draft, which shows through the canvas, representing very naturally the fire in the heater.

At the same time the two electric lights above the thermostats are lighted and the heat from the two electric bulbs very quickly causes the thermostats to again close the dampers, when the lights are extinguished. The thermostats quickly cool off and again open the drafts when the lights are turned on so that the actual operation of a regulator on a plant is demonstrated in a practical and efficient way.

The Central Culm Furnace Co., Scranton, Pa., has been incorporated with a capital of $150,000 to manufacture furnaces and heating boilers. The incorporators are Henry J. Gunster, George N. Gunster, Arthur Gunster and C. A. Crossley, all of Scranton, Pa.

CALENDARS AND TRADE LITERATURE.

A. M. Goddard, Tacoma, Wash., is long on calendars—18¾ in. in fact. No one but a plumber, who gives good measure to his customers, could get out such a serviceable reminder of the aviation of time. The editor has bagged the prize.

The Shirley Radiator & Foundry Co., Indianapolis, Ind., is mailing to the trade a calendric study in red, black and white. Its cheerful appearance will help to make every day a red-letter day.

W. C. Hunter, 213 N. Buckeye St., Kokomo, Ind., issues a calendar illustrative of an imminent tragedy in bathroom fixtures, combining "caws" and effect. Fortunately nobody pulled the string.

PATENTS.

943,689, Radiator—Samuel Lavine, Detroit, Mich.

943,755, Tank valve—John T. Morrison, Minneapolis, Minn.

943,793, Flushing tank for closets—Frederick A. Schossow, Detroit, Mich.

943,824, Valve—James Garvie, Cleveland, Transvaal.

943,832, Heating apparatus—Joseph M. W. Kitchen, East Orange, N. J.

943,842, Eel trap—Gennaro G. Passaro, Stamford, Conn.

943,848, Vacuum pump—Frank A. Simonds, Grand Rapids, Mich., assignor to Simonds Heating & Specialty Co., Fremont, Mich., a Corporation of Michigan.

943,900, Pipe coupling—Clark J. Smith, Ottumwa, Iowa, assignor to Hardsocg Wonder Drill Co., Ottumwa, Iowa, Incorporated.

943,559, Automatic cut off valve—Julius Miller, Youngstown, Ohio.

943,573, Universal joint device—Julius Simon, Vincennes, France.

943,904, Slip joint for steam pipes—Julius E. Struer, Brooklyn, N. Y.

943,911 and 943,912, Steam and vacuum pump—Robert E. Cecil, Ambridge, and Clifford R. Wassell, Sewickley, Pa.

943,959, Lubricating device—Reinier F. O. G. van Zoelen, Helder, Netherlands.

944,024, Air valve—Hugh A. Fitzpatrick, Chicago, Ill.

944,025, Blow-off valve or cock—William T. Fowden, Chester, Pa.

944,026, Valve—William T. Fowden, Chester, Pa.

944,032, Circulating pump—Eduard Guenther, West New York, N. J.

944,098, Flushing valve—Melville B. Mahurin, Muskingum township, Washington Co., Ohio.

944,155, Valve—Wilfred Shurtleff, Moline, Ill., assignor of one-half to Moline Vacuum-Vapor Heating Co., Moline, Ill., a Corporation of Illinois. Among the claims made for this invention the broadest reads as follows: "A device of the class described, comprising a casing provided at one end with an inlet, and at its side with an outlet, a perforated diaphragm between the inlet end and the body of the casing, a sleeve resting on the diaphragm, and encircling the perforation, said sleeve being provided with a longitudinal series of side openings of different diameters and forming a communication between the inlet and the outlet, a valve movable in the sleeve for closing the perforation of the diaphragm, means for moving the valve, means for limiting the opening movement thereof for the purpose specified, and a nut threaded into the casing and carrying the valve and of greater diameter than the sleeve."

944,183, Heating system—Norris M. Finley, Norristown, Pa.

944,187, Heating system—Egbert H. Gold, Chicago, Ill.

13,059, Heating system—Egbert H. Gold, Chicago, Ill.

Burlington, Iowa.—The Russell Sewage Disposal Company, of this city, sold to the Ott Hardware Co., of Santa Barbara, California, a sewage disposal system for Mrs. Strong's new residence in Montecito, California.—Adv.

CLASSIFIED ADVERTISEMENTS

Help Wanted

Salesman Wanted.

Boiler salesman with established trade. Address No. 193, "Domestic Engineering," 325 Dearborn St., Chicago.

Wanted.

Reliable man for first class steamfitting contracting business; must be capable and ready to invest $2,500 in the business. An exceptional opportunity for the right man. Address No. 191, "Domestic Engineering," 325 Dearborn St., Chicago.

A western jobber who is about to publish a fixture catalog would like to get in touch with five or six jobbers of plumbing supplies with view of dividing the expense of compiling. Address No. 195, "Domestic Engineering," 325 Dearborn St., Chicago.

Journeymen Wanted.

Sober, ambitious journeymen, competent to earn $4.50 per 8 hour day; steady work for the right men; no applications considered without references; transportation will be refunded to applicants accepted. J. M. Robb, 602 Y. M. C. A. Building, Peoria, Ill.

Situations Wanted

Positions Wanted.

Who wants a Plumber and Steamfitter, one with business experience; can estimate and take charge of job; temperate and married. Address No. 194, "Domestic Engineering," 325 Dearborn St., Chicago.

Chicago plumber and steamfitter with 15 years' experience would like to secure work in smaller town. Am able and energetic and could take entire charge of business. Address No. 192, "Domestic Engineering," 325 Dearborn St., Chicago.

PERSONAL.

If Owen E. Newlon, plumber and electrician, will correspond with the Newlon Foundry & Machine Co., Grafton, W. Va., he will learn something to his interest. Any information furnished by any one regarding the whereabouts of said Owen E. Newlon will be thankfully received.

Plumbing Schools.

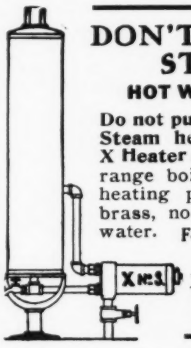
Learn plumbing on new buildings in four months. Tools furnished. Master Plumbers' Trade School, 3659 Finney Ave., St. Louis, Mo.

Books

Notes on Heating and Ventilation. Second edition. By Prof. John R. Allen. Written primarily for the steamfitter and designer of heating systems. Reduced to as brief a form as possible, so that readers can readily find notes or data desired. Bound in cloth, 6¾x4¾ inches; 272 pp.; postpaid, $2.00. "Domestic Engineering," Chicago.

Plumbing Catechism. By Charles B. Ball. Second edition. This book formulates, in question and answer form, the basic principles of plumbing design and practice. It is therefore especially commended to students in engineering and trade schools, and to master and journeymen plumbers, preparing for examinations. Bound in cloth; 6¾x4¾ inches; 100 pp.; postpaid, $1.00. "Domestic Engineering," Chicago.

Tables for Calculating Sizes of Steam Pipes. By Isaac Chaimovitsch. These tables furnish a method of determining sizes of steam pipes for low pressure heating without laborious methematical calculations; bound in cloth; 4½x6⅞ in.; 47 pp.; postpaid, $2.00. "Domestic Engineering," Chicago.



DON'T WASTE STEAM

HOT WATER FREE

Do not put a coil in your Steam heater but use an **X Heater** connected to your range boiler and steam heating plant. Made of brass, no rust, no dirt in water. **For prices and circulars write to**

X Specialty Co.
46 Weir Street
Taunton, Mass.

RACK LABELS

PRACTICAL FOR PLUMBERS

Easily applied to shelves, racks or drawers. Shows what you want at a glance; no more guessing or delayed customers. Not only tells the article, but **illustrates it.** Systematizes and facilitates stock taking. It's a money saver! Printed in plain, readable type.

Write for Prices

MERCANTILE LABEL CO.
NASHUA, N. H.

Patent Dec. 8, 1908

Adjustable Radiator Foot Rest

The time saved on each job pays for them—can be used for bath tubs and other fixtures

The Jennison Company **Fitchburg, Mass.**

Sold by Jobbers

What Sizes of Pipes Should be Used in Steam Heating Plants?

This is an Every-day Question to the Steam Fitter. His Success Largely Depends Upon Finding the Correct Answer

"SIZES OF FLOW AND RETURN STEAM MAINS"

Includes the replies of 26 leading American engineers to this question together with the report of the Committee of The American Society of Heating and Ventilating Engineers upon "Standard Sizes of Steam and Return Mains."

This little book is a complete summary of present-day theory and practice as reflected by the opinions of those best competent to judge.

No Steam Fitter can afford to be without this book. **Bound in Boards—Price, postage prepaid, 50 cents**

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